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Imperial Sand Dunes

Draft Recreation Area Management Plan and Draft Environmental Impact Statement Volume II of II

BLM

El Centro Field Office

United States Department of the Interior
Bureau of Land Management
March 2010



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APPENDIX A

Results of Scoping

Introduction

The Planning Area encompasses approximately 150,000 acres of public lands located in extreme southeastern California, near the Arizona and US–Mexico border in Imperial County, bounded to the west by the Old Coachella Canal, to the east by the UPRR, to the north by Mammoth Wash, and to the south by I-8 and the US–Mexico border.

The primary activities in the Planning Area include OHV recreation and camping. The Imperial Sand Dunes consist of a typical sand dune habitat with the larger dunes found in the central portion of the Planning Area. Microphyll woodlands can be found on the eastern edge of the sand dunes and comprise several species, including paloverde, mesquite, and ironwood.

Scoping process

A. Notice of Intent

BLM published a Notice of Intent to Prepare a Resource Management Plan for the Imperial Sand Dune Recreation Area, California and an associated Environmental Impact Statement in the *Federal Register* on March 18, 2008. The NOI states:

Public participation will be especially important at several points during the analysis and planning process. The scoping process (40 CFR 1501.7) for this analysis will include identification of issues and viable alternatives as well as identification and notification of interested groups, individuals and agencies to determine level of participation and obtain additional information concerning issues to be addressed in the RAMP/EIS.

B. Public Scoping Meetings

On April 4, 2008, BLM published a news release announcing three public scoping meetings for the RAMP planning effort. The dates and locations of each meeting are listed below: Tuesday, April 22, 2008 at the Handlery Hotel in San Diego, California; Wednesday, April 23, 2008 at the Mountain Preserve Reception and Conference Center in Phoenix, Arizona; and Thursday, April 24, 2008 at the Imperial Irrigation District William R. Condit Meeting Room in El Centro, California.

Approximately 30 members of the public, mainly OHV users, discussed the future management of the ISD SRMA at the scoping meetings in San Diego and El Centro, California, and Phoenix, Arizona.

BLM did not make formal presentations at the public meetings; attendees were free to explore displays and ask questions of the subject matter experts present. BLM representation at each scoping meeting included: Vicki Wood, Field Manager; Thomas Zale, Associate Field Manager; Erin Dreyfuss, NEPA Coordinator; Michael Boxx, Law Enforcement Chief; Neil Hamada, Outdoor Recreation Planner; and Marisa Williams, Outdoor Recreation Planner for Vending. Stephen Razo of CDD also attended the meeting in Phoenix and Sandra McGinnis, CASO NEPA Coordinator, attended the meeting in San Diego. During the meetings, attendees were encouraged to take extra information packages and comment forms and distribute them to interested individuals that were not able to attend the meetings.

Issue Summary

A. Summary of Public Comments, Issues, and Concerns

BLM did not receive scoping comments from any agencies. Letters were received from the following clubs and organizations:

- American Sand Association
- Center For Biological Diversity
- EcoLogic
- R and R Duners Club
- SandEaters
- San Diego Off-Road Coalition
- United Desert Gateway

The following issues and concerns represent the key themes and priorities that emerged during the public scoping process. These key issues and priorities will be considered for analysis in the RAMP/EIS, in addition to preliminary issues identified by BLM personnel, cooperating agencies, and user groups.

Key issues:

- Identification of areas that are open and closed to OHV recreation
- Re-evaluation of the need for an Adaptive Management Area
- Re-evaluation of the need for administrative closures to protect biological resources
- Management of the commercial vending program
- Management of the fee program
- Identification of allowable uses within each area of the Planning Area
- Identification of how BLM intends to carry out resource protection (e.g., microphyll woodlands, invertebrates, plants, cultural resources)

Concerns:

- Facilities management
- Law enforcement/public health and safety
- Border issues
- Interpretive program management
- Possibility of concessions as a management tool
- The question of visitor capacity
- Solid waste/hazardous materials management

B. Issues Raised that will not be Addressed

Certain issues raised during scoping will not be addressed in the Imperial Sand Dunes RAMP/EIS, because they are either outside the scope of this planning process or are outside the authority of BLM.

Establishing new OHV Recreation Areas Outside of the ISD SRMA

Many clubs and organizations requested that BLM consider establishing new areas for OHV recreation on other lands in the ECFO. While the ECFO will consider making more areas available for OHV recreation within the Planning Area, the scope of the RAMP/EIS will be limited to BLM-administered lands in the 150,000-acre Planning Area based on the following rationale:

The purpose and need for the RAMP/EIS is mostly based on the designation of new critical habitat for PMV and the management of the ISD SRMA as it relates to this new designation. BLM acknowledges that there are concerns about the loss of public lands available for OHV use, but the RAMP/EIS will analyze a range of alternatives, including the No Action Alternative, which would allow OHV use to continue in the Planning Area at the same levels prior to the ROD for the 2003 RAMP.

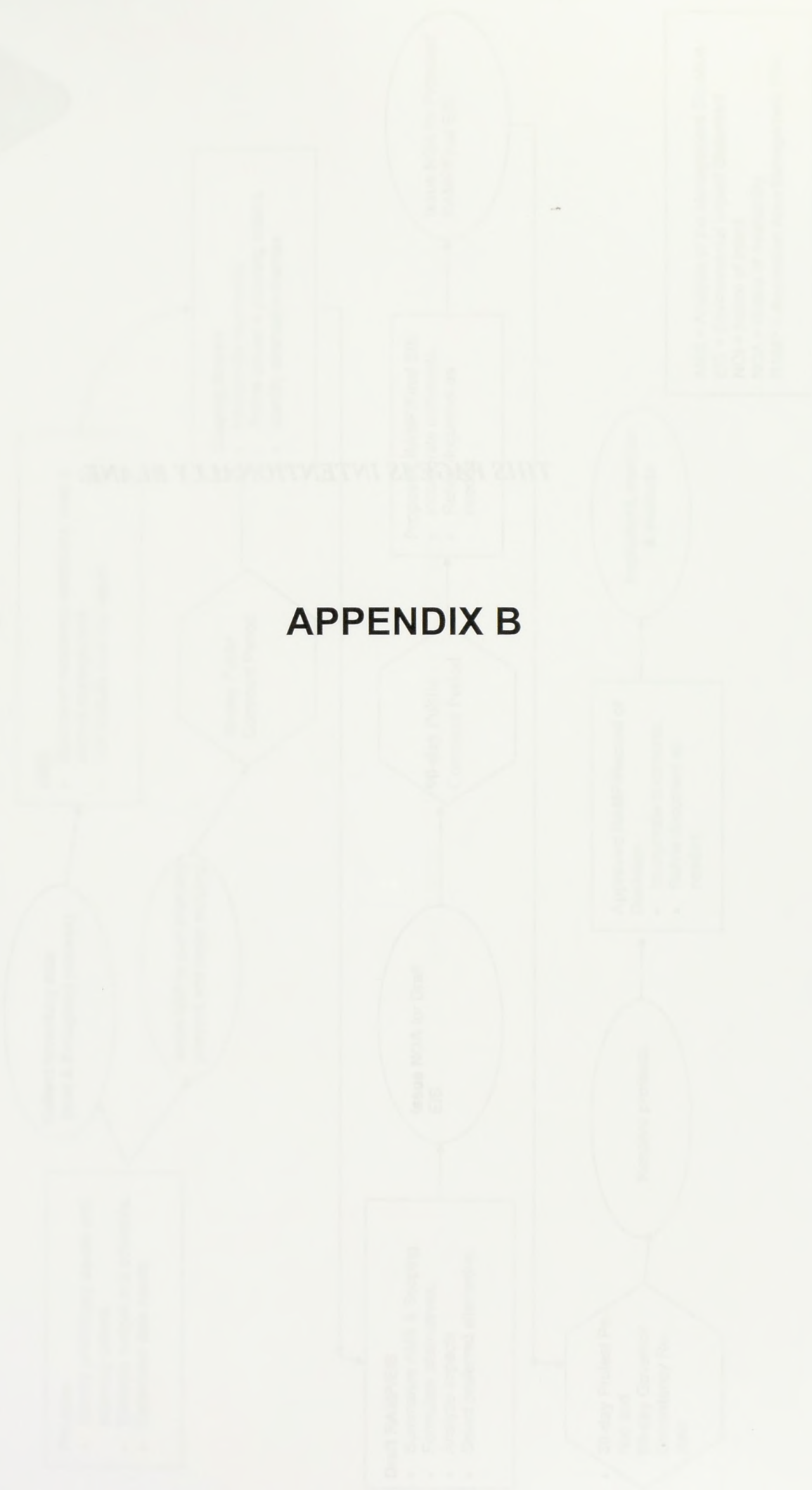
Pursuant to NEPA, 40 CFR 1506.1(c) states:

While work on a required program environmental impact statement is in progress and the action is not covered by an existing program statement, agencies shall not undertake in the interim any major Federal action covered by the program which may significantly affect the quality of the human environment unless such action:

- (1) Is justified independently of the program;*
- (2) Is itself accompanied by an adequate environmental impact statement; and*
- (3) Will not prejudice the ultimate decision on the program. Interim action prejudices the ultimate decision on the program when it tends to determine subsequent development or limit alternatives [emphasis added].*

In light of these considerations, BLM has determined that it is appropriate to maintain the scope of the current RAMP/EIS within the 150,000-acre Planning Area. Furthermore, any proposal developed on BLM lands outside of the Planning Area for this purpose would need to be accompanied by an adequate EIS, and the existing BLM resources and personnel allocated to the RAMP/EIS are dedicated to addressing the purpose and need outlined in Chapter 1 of the Scoping Report.

The BLM Planning Process



APPENDIX B

The purpose and scope of the study is to provide information on the status of the water supply in the City of Los Angeles and to provide information on the water supply in the City of Los Angeles. The study is to provide information on the water supply in the City of Los Angeles and to provide information on the water supply in the City of Los Angeles.

Appendix A: Water Supply in the City of Los Angeles

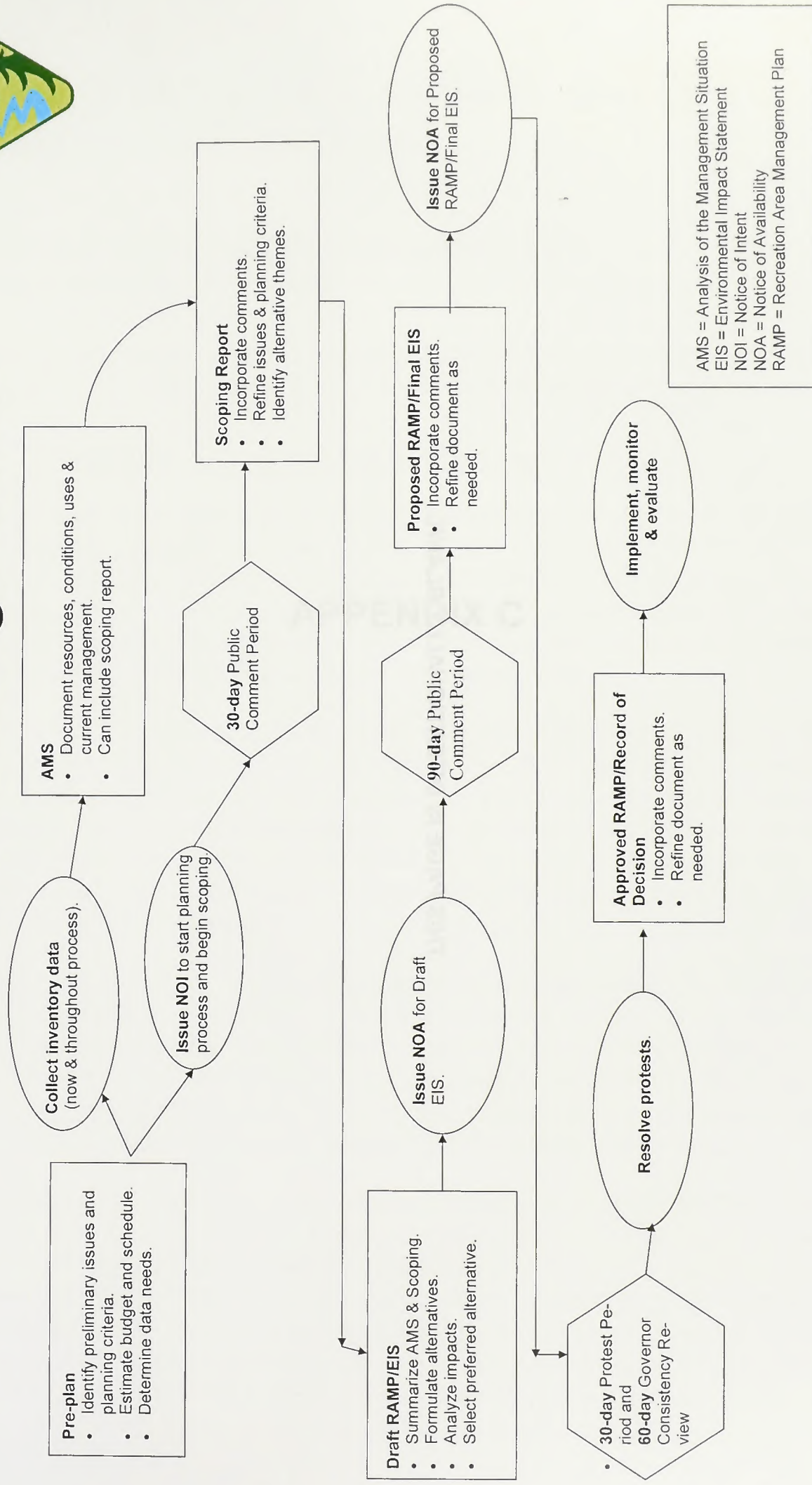
While water is a natural resource, it is not infinite. It is a resource that is being used at an increasing rate. The water supply in the City of Los Angeles is being used at an increasing rate. The water supply in the City of Los Angeles is being used at an increasing rate.

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- (3) Will not provide any information on the water supply in the City of Los Angeles.

APPENDIX B

In light of these considerations, the study is to provide information on the water supply in the City of Los Angeles. The study is to provide information on the water supply in the City of Los Angeles. The study is to provide information on the water supply in the City of Los Angeles.





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The BTM Planning Process



Typical Management Actions and Best Management Practices

Vegetation Treatment (Including Fire Management Activities)

The following measures are intended to protect riparian habitat and are intended to be used in conjunction with other measures to protect riparian habitat.

A. Channel

Channel management is a critical component of riparian habitat management. Channel management activities should be designed to maintain channel stability and prevent channel degradation. Channel management activities should be designed to maintain channel stability and prevent channel degradation. Channel management activities should be designed to maintain channel stability and prevent channel degradation.

APPENDIX C

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Typical Management Actions and Best Management Practices

Vegetation Treatments (Including Fire Management Activities)

The following chemical, mechanical, manual, biological, and fire treatment methods would be used to achieve vegetation management objectives in the Planning Area.

A Chemical

BLM would use EPA-approved herbicides in accordance with EPA's Endangered Species Pesticide Program covered in the BLM's Vegetation Treatment Using Herbicides on BLM Lands in Seventeen Western States Draft PEIS (BLM 2007a). These herbicides are: Atrazine; Bromacil; Bromacil + Diuron; 2,4-D, 2,4-DP, Dicamba; Dicamba + 2,4-D; Diuron; Glyphosate; Glyphosate + 2,4-D; Hexazinone; Fosamine, Imazapyr; Picloram; Picloram + 2,4-D; Simazine; Tebuthiuron; and Triclopyr.

Buffer zones would be used adjacent to dwellings, domestic water sources, agricultural land, streams, lakes and ponds. A minimum buffer zone of 100 feet would be provided for aerial application, 25 feet for vehicle application, and 10 feet for hand application. Any deviations must be in accordance with the label for the herbicide. Herbicides would be manually applied on individual plants within 10 feet of water where application is critical. The buffer zones described above would provide additional protection to listed, proposed, and candidate species.

BLM would work closely with the USFWS to ensure that herbicide applications would not affect listed or proposed, threatened, and endangered species on a project-level basis. If adverse effects are anticipated during informal consultation, BLM would formally consult on these projects. If USFWS develops herbicide guidance for particular species that improves protection beyond the current BLM design features, BLM would consider and incorporate that guidance as it consults with USFWS on a project-level basis.

The chemicals can be applied by many different methods, and the selected technique depends on a number of variables. Some of these are: 1) the treatment objective (removal or reduction); 2) the accessibility, topography, and size of the treatment area; 3) the characteristics of the target species and the desired vegetation; 4) the location of sensitive areas in the immediate vicinity (potential environmental impacts); 5) the anticipated costs and equipment limitations; and 6) the meteorological and vegetative conditions of the treatment area at the time of treatment. Herbicide applications would be

timed to have the least impact on non-target plants and animals consistent with the objectives of the vegetation management program.

The chemicals would be applied aerially with helicopters or fixed-wing aircraft, or on the ground using vehicles or manual application devices. Helicopters are more expensive to use than fixed-wing aircraft, but they are more maneuverable and effective in areas with irregular terrain and in treating specific target vegetation in areas with many vegetation types. Manual applications are used only for treating small areas or those inaccessible by vehicle.

Rates of herbicide application would depend on the target species, other vegetation present, soil type, depth of the ground water table, and presence of water sources. When target species occur in riparian areas, the application rate would be reduced to minimize injury to non-target species.

During aerial applications, nozzles to reduce drift would be used for all liquid applications. Liquid herbicides would not be applied when wind speed exceeds 5 miles per hour, and granular herbicides would not be applied when wind speed exceeds 10 miles per hour. Herbicides would not be applied when conditions stated on the herbicide label cannot be met and when air turbulence significantly affects the desired spray pattern. Buffer zones to protect water resources would be provided according to guidance mentioned above in this appendix.

Vehicle-mounted sprayer (hand gun or boom) applications would be mainly used in open areas that are readily accessible by vehicle. The boom would be used only where feasible to treat concentrated weed infestations. The hand gun would be used for spot treatment of weeds and only up to the high water line near water bodies. Neither hand guns nor booms would be used in riparian areas where weeds are closely intermingled with native shrubs and trees. Under both hand gun and boom methods, sprays would be applied in a manner that gives the best possible coverage with the least amount of drift, and only when wind velocity is below 8 miles per hour, except in riparian areas where treatment would be applied only at wind speeds below 5 miles per hour. Boom sprayers would not be used within 25 feet of water bodies.

Hand applications could involve backpack spraying, hand wiping application, and cyclone broadcast spreading (granular formulations). Backpack sprayers are operated at low pressure and low volume and release herbicide through a single nozzle held from 0.5 to 2.5 feet above the ground when wind velocities do not exceed 8 miles per hour. Near water, wind velocities cannot exceed 5 miles per hour. Contact systemic herbicides, such as glyphosate, wiped on individual plants, would be used up to the existing high water line. Granular formulations would be applied through broadcast spreaders at about 3.5 feet above the ground and no closer than 10 feet from the high water line of streams and other water bodies.

Herbicide applications are scheduled and designed to minimize potential impacts on non-target plants and animals, while remaining consistent with the objective of the vegetation treatment program. The rates of application depend on the target species, presence, and condition of non-target vegetation, soil type, depth to the water table, presence of other water sources, and the requirements of the label.

In many circumstances, the herbicide chosen, time of treatment, and rate of application of the herbicide are different than the most ideal herbicide application for maximum control of the target plant species in order to minimize damage to the non-target plant species and to ensure minimum risk to human health and safety.

B Mechanical

Mechanical methods of vegetation treatment employ several different types of equipment to suppress, inhibit, or control herbaceous and woody vegetation (Vallentine 1980). The goal of mechanical treatments is to kill or reduce the cover of undesirable vegetation and thus encourage the growth of desirable plants. BLM uses wheel tractors, crawler-type tractors, mowers, or specially designed vehicles with attached implements for mechanical vegetation treatments. The use of mechanical equipment to reduce fuel hazards would be conducted in accordance with BLM-established procedures. Re-seeding after a mechanical treatment has been applied is important to help ensure that desirable plants would become established on the site and not invasive species. The mechanical treatment and re-seeding should occur at a time to best control the undesirable vegetation and encourage the establishment of desirable vegetation. The best mechanical method for treating undesired plants in a particular location depends on the following factors:

- Characteristics of the undesired species present such as plant density, stem size, woodiness, brittleness, and re-sprouting ability
- Need for seedbed preparation, re-vegetation, and improved water infiltration rates
- Topography and terrain
- Soil characteristics such as type, depth, amount and size of rocks, erosion potential, and susceptibility to compaction
- Climatic and seasonal conditions
- Potential cost of improvement as compared to expected results

Bulldozing is conducted with a wheeled or crawler tractor with a heavy hydraulic controlled blade. Vegetation is pushed over and uprooted, and then left in windrows or piles. Bulldozing is best adapted to removing scattered stands of large brushes or trees.

There are several different kinds of blades available depending on the type of vegetation and goals of the project. The disadvantage of bulldozing is soil disturbance and damage to non-target plant species.

C Manual

Hand-operated power tools and hand tools are used in manual vegetation treatment to cut, clear, or prune herbaceous and woody species. In manual treatments, workers would cut plants above ground level; pull, grub, or dig out plant root systems to prevent subsequent sprouting and re-growth; scalp at ground level or remove competing plants around desired vegetation; or place mulch around desired vegetation to limit the growth of competing vegetation. Hand tools such as the handsaw, axe, shovel, rake, machete, grubbing hoe, mattock (combination of axe and grubbing hoe), brush hook, and hand clippers are used in manual treatments. Axes, shovels, grubbing hoes, and mattocks can dig up and cut below the surface to remove the main root of plants such as prickly pear and mesquite that have roots that can quickly resprout in response to surface cutting or clearing. Workers also may use power tools such as chain saws and power brush saws.

Manual methods are highly labor intensive, requiring periodic retreatment, ranging from every three weeks during the growing season to annually, depending on the target species. These methods have been successful in controlling annuals and biennials, but are ineffective in controlling creeping perennials.

D Cultural Resources

Should cultural and/or paleontological resources be encountered during project ground-disturbing activities, work will cease in the area of the discovery, and the BLM cultural resource specialist will be notified immediately. Work may not resume until written authorization to proceed is issued by the BLM cultural resource specialist.

The management of cultural resources on BLM land must be in compliance with several federal laws, including the Antiquities Act of 1906; the NHPA of 1966, as amended; the NEPA of 1969; EO 11593, "Protection and Enhancement of the Cultural Environment," the FLPMA of 1976; the American Indian Religious Freedom Act of 1978; the Archaeological Resources Protection Act of 1979; the Native American Graves Protection and Repatriation Act of 1990; EO 13007, "Indian Sacred Sites," and EO 13287, "Preserve America." In addition, the BLM manages its cultural resources according to BLM Manual 8100, "The Foundation for Managing Cultural Resources," Manual 8110, "Identifying and Evaluating Cultural Resources," and Manual 8140, "Protecting Cultural Resources." These laws and regulations direct BLM to:

- Restrict public information about the locations of sites that are not allocated to public use, as allowed by law and regulation.

- Ensure that all proposed undertakings and authorizations are reviewed and conducted in compliance with applicable federal laws including Section 106 of the NHPA.
- Complete consultations with the California SHPO prior to project implementation, as necessary.
- Ensure that information on Native American religious and cultural issues receives good faith consideration during decision making and that government-to-government consultation procedures are carried out as appropriate for each proposed action.

E Paleontological Resources

If vertebrate or noteworthy occurrences of invertebrate or plant fossils are discovered, the user/operator shall suspend all operations that further disturb such materials and immediately contact the authorized officer. User/operators shall not resume until written authorization to proceed is issued by the authorized officer. The authorized officer would evaluate the discovery and inform the operator of actions that would be necessary to prevent loss of significant scientific values. The user/operator shall be responsible for the cost of any mitigation required by the authorized officer. Upon verification from the authorized officer that the required mitigation has been completed, the operator shall be allowed to resume operations.

F Special Designation Areas

Guidelines and operating procedures for all management activities in WAs are provided in BLM Manual 8560, Management of Designated Wilderness Areas, and in Wilderness Management Plans, where completed for specific WAs.

ACECs are established through the land use planning process. The desired conditions and management prescriptions for these special areas would be considered in implementing management activities.

Wildland Fire Management

A Appropriate Management Response

The appropriate management response concept represents a range of available management responses to wildland fires. Responses range from full fire suppression to managing fires for resource benefits (fire use). Management responses applied to a fire would be identified in the fire management plans and would be based on objectives derived from the land use allocations; relative risk to resources, the public and fire

fighters; potential complexity; and the ability to defend management boundaries. Any wildland fire can be aggressively suppressed, and any fire that occurs in an area designated for fire use can be managed for resource benefits if it meets the prescribed criteria from an approved fire management plan.

B Fire Suppression Actions

Suppression tactics would be utilized that limit damage or disturbance to the habitat and landscape. No heavy equipment would be used (such as dozers), unless approved by the Field Office Manager.

Use of fire retardants or chemicals adjacent to waterways would be accomplished in accordance with the *Environmental Guidelines for Delivery of Retardant or Foam Near Waterways: Interagency Standards for Fire and Aviation Operations* (National Interagency Fire Center 2009).

The general and species-specific Conservation Measures would be implemented to the extent possible to minimize adverse effects to federally listed, proposed, or candidate species occurring within the action area.

For fire suppression activities in PMV critical habitat, a protocol for consultation would be developed as a part of the BO. This programmatic consultation would contain conservation measures and prescriptions for use in fire suppression activities. Emergency consultation should only be needed in the future, if suppression actions fall outside of these prescriptions/measures. The BO would outline coordination needs for emergency response actions that may affect a listed/proposed species and/or critical habitat. The following protocol would apply: BLM would contact the appropriate USFWS biologist as soon as practical once a wildfire starts and a determination is made that a federally protected species and/or its habitat could be affected by the fire and/or fire suppression activities. USFWS would work with BLM during the emergency response to apply the appropriate conservation measures. When conservation measures cannot be applied during the suppression activities, BLM would, after the fact, need to consult on any suppression actions that may have affected the federally protected species or its habitat. If conservation measures are adhered to, BLM would report on the actions taken and effects to the species and its habitat following the fire, but no further consultation on that incident would be required.

In WAs, minimum impact suppression tactics would be applied and coordinated with WA management objectives and guidelines when fire suppression actions are required (National Interagency Fire Center 2009).

C Cultural Resources

All known cultural resources would be protected from disturbance to the extent possible.

Should cultural resources be encountered during wildland fire suppression, the BLM cultural resource specialist will be notified immediately. Work may not resume until written authorization to proceed is issued by the BLM cultural resource specialist.

D Paleontological Resources

If vertebrate or noteworthy occurrences of invertebrate or plant fossils are discovered, during wildland fire suppression, the BLM or appropriate resource advisor will be notified as soon as possible.

Discretionary Construction Activities

The following measures would reduce fugitive dust impacts:

1. All unpaved construction areas shall be sprinkled with water or other acceptable ICAPCD dust control agents during dust-generating activities to reduce dust emissions. Additional watering or acceptable ICAPCD dust control agents shall be applied during dry weather or windy days until dust emissions are not visible.
2. Trucks hauling dirt and debris shall be covered to reduce windblown dust and spills.
3. On dry days, dirt or debris spilled onto paved surfaces shall be swept up immediately to reduce resuspension of particulate matter caused by vehicle movement. Approach routes to construction sites shall be cleaned daily of construction-related dirt in dry weather.
4. On-site stockpiles of excavated material shall be covered or watered.
5. Automatic water or mist or sprinkler system should be installed in areas of rock crushing and conveyor belt systems.
6. Use low pollutant-emitting construction equipment.
7. Equip construction equipment with prechamber diesel engines (or equivalent) together with proper maintenance and operation to reduce emissions of nitrogen oxide, to the extent available and feasible.
8. Use electrical construction equipment, to the extent feasible.

A Cultural Resources

All known cultural resources would be protected from disturbance.

Should cultural resources be encountered during project ground-disturbing activities, work will cease in the area of the discovery, and the BLM cultural resource specialist will be notified immediately. Work may not resume until written authorization to proceed is issued by the BLM cultural resource specialist.

The management of cultural resources on BLM land must be in compliance with several federal laws, including the Antiquities Act of 1906; the NHPA of 1966, as amended; the NEPA of 1969; EO 11593, "Protection and Enhancement of the Cultural Environment," the Federal Land Policy and Management Act of 1976; the American Indian Religious Freedom Act of 1978; the Archaeological Resources Protection Act of 1979; the Native American Graves Protection and Repatriation Act of 1990; EO 13007, "Indian Sacred Sites," and EO 13287, "Preserve America." In addition, the BLM manages its cultural resources according to BLM Manual 8100 through 8170, and in accordance with the statewide protocol from the California SHPO and other guidelines from the SHPO. These laws and regulations direct BLM to:

- Restrict public information about the locations of sites that are not allocated to public use, as allowed by law and regulation.
- Ensure that all proposed undertakings and authorizations are reviewed and conducted in compliance with applicable federal laws including Section 106 of the NHPA.
- Complete consultations with the California SHPO prior to project implementation, as necessary.
- Ensure that information on Native American religious and cultural issues receives good faith consideration during decision making and that government-to-government consultation procedures are carried out as appropriate for each proposed action.

B Paleontological Resources

If vertebrate or noteworthy occurrences of invertebrate or plant fossils are discovered, the user/operator shall suspend all operations that further disturb such materials and immediately contact the authorized officer. User/operators shall not resume until written authorization to proceed is issued by the authorized officer. The authorized officer would evaluate the discovery and inform the operator of actions that would be necessary to prevent loss of significant scientific values. The user/operator shall be responsible for the cost of any mitigation required by the authorized officer. Upon verification from the

authorized officer that the required mitigation has been completed, the operator shall be allowed to resume operations.

C Special Designation Areas

Guidelines and operating procedures for all management activities in WAs are provided in BLM Manual 8560, *Management of Designated Wilderness Areas*, and in Wilderness Management Plans, where completed for specific WAs.

ACECs are established through the land use planning process. The desired conditions and management prescriptions for these special areas would be considered in implementing management activities.

D Visual Resources

There are numerous design techniques for Visual Resources that can be used to reduce the visual impacts from surface-disturbing projects. These techniques should be used in conjunction with BLM's visual resource contrast rating process wherein both the existing landscape and the proposed development or activity are analyzed for their basic elements of form, line, color, and texture. Design techniques are discussed in the BLM VRM Manual (MS 8400) in terms of fundamentals and strategies. The fundamentals and strategies are all interrelated, and when used together, can help resolve visual impacts from proposed activities or developments. Guidance and BMP for visual resources include the Visual Contrast Rating Handbook H-8431-1, the PEIS for Wind Energy Development (Record of Decision [ROD] signed in December 2005), PEIS for Geothermal Energy Development (ROD signed in December 2008), West-wide Corridor Programmatic EIS (November 2008), and the BLM VRM website (<http://www.blm.gov/nstc/VRM/>).

Design fundamentals are general design principles that can be used for all forms of activity or development, regardless of the resource value being addressed. Applying these three fundamentals will help solve most visual design problems:

- Proper siting or location
- Reducing unnecessary disturbance
- Repeating the elements of form, line, color, and texture

Design strategies are more specific activities that can be applied to address visual design problems. Not all of these strategies will be applicable to every proposed project or activity:

- Color selection

- Earthwork
- Vegetative manipulation
- Structures
- Reclamation/restoration
- Linear alignment design considerations

Wildlife Habitat Activities

A Typical Habitat Improvements

Following is a discussion of typical design features, construction practices, and implementation procedures for habitat improvements that could be constructed following approval of the RAMP/ROD. The extent, location, and timing of such actions would be based on specific management objectives adopted through the evaluation process, interdisciplinary development and analysis of proposed actions, and funding.

Wildlife Waters and Reservoirs: Water developments would include design features to ensure safety and accessibility to water by desirable wildlife. These features will include ramps to allow wildlife to escape, should they become trapped.

Vending

- Vending would continue to be permitted seven days a week at long-term vending areas.
- Vending would be permitted from October 1 through May 31 from noon Thursday through noon Monday at the short-term vending areas. All vending materials, supplies, and related vending material would be required to be physically removed from the Planning Area from Monday at noon to Thursday at noon.
- Vending would be expanded to include seven days a week vending from noon on December 25 through noon on the Monday following January 1.
- Vending would be expanded to include the seven days prior to Easter.
- Vending would be allowed on all observed federal holidays.
- Vending would be allowed from noon the Thursday before Thanksgiving to noon the Monday following Thanksgiving.

- Non-recreational commercial activities (such as filming) would not be routinely allowed during the high use holiday periods.

Wind Energy

The BMP for wind energy are adopted from the Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments ROD (December 2005). These BMP are as follows:

A Best Management Practices

The BMP will be adopted as required elements of project-specific PODs and/or as ROW authorization stipulations. They are categorized by development activity: site monitoring and testing, development of the POD, construction, operation, and decommissioning. The BMP for development of the POD identify required elements of the POD needed to address potential impacts associated with subsequent phases of development.

A.1 Site Monitoring and Testing

- The area disturbed by installation of meteorological towers (i.e., footprint) shall be kept to a minimum.
- Existing roads shall be used to the maximum extent feasible. If new roads are necessary, they shall be designed and constructed to the appropriate standard.
- Meteorological towers shall not be located in sensitive habitats or in areas where ecological resources known to be sensitive to human activities (e.g., prairie grouse) are present. Installation of towers shall be scheduled to avoid disruption of wildlife reproductive activities or other important behaviors.
- Meteorological towers installed for site monitoring and testing shall be inspected periodically for structural integrity.

A.2 Plan of Development Preparation

A.2.1 General

- The BLM and operators shall contact appropriate agencies, property owners, and other stakeholders early in the planning process to identify potentially sensitive land uses and issues, rules that govern wind energy development locally, and land use concerns specific to the region.

- Available information describing the environmental and sociocultural conditions in the vicinity of the proposed project shall be collected and reviewed as needed to predict potential impacts of the project.
- The Federal Aviation Administration (FAA)-required notice of proposed construction shall be made as early as possible to identify any air safety measures that would be required.
- To plan for efficient use of the land, necessary infrastructure requirements shall be consolidated wherever possible, and current transmission and market access shall be evaluated carefully.
- The project shall be planned to utilize existing roads and utility corridors to the maximum extent feasible, and to minimize the number and length/size of new roads, lay-down areas, and borrow areas.
- A monitoring program shall be developed to ensure that environmental conditions are monitored during the construction, operation, and adaptive management strategies, shall be established at the project level to ensure that potential adverse impacts of wind energy development are mitigated. The monitoring program shall identify the monitoring requirements for each environmental resource present at the site, establish metrics against which monitoring observations can be measured, identify potential mitigation measures, and establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and BMP.
- “Good housekeeping” procedures shall be developed to ensure that during operation the site will be kept clean of debris, garbage, fugitive trash or waste, and graffiti; to prohibit scrap heaps and dumps; and to minimize storage yards.

A.2.2 Wildlife and Other Ecological Resources

- Operators shall review existing information on species and habitats in the vicinity of the project area to identify potential concerns.
- Operators shall conduct surveys for federal and/or state-protected species and other species of concern (including special status plant and animal species) within the project area and design the project to avoid (if possible), minimize, or mitigate impacts to these resources.
- Operators shall identify important, sensitive, or unique habitats in the vicinity of the project and design the project to avoid (if possible), minimize, or mitigate impacts to these habitats (e.g., locate the turbines, roads, and ancillary facilities in the least environmentally sensitive areas; i.e., away from riparian habitats, streams, wetlands, drainages, or critical wildlife habitats).

- The BLM will prohibit the disturbance of any population of federally listed plant species.
- Operators shall evaluate avian and bat use of the project area and design the project to minimize or mitigate the potential for bird and bat strikes (e.g., development shall not occur in riparian habitats and wetlands). Scientifically rigorous avian and bat use surveys shall be conducted; the amount and extent of ecological baseline data required shall be determined on a project basis.
- Turbines shall be configured to avoid landscape features known to attract raptors, if site studies show that placing turbines there would pose a significant risk to raptors.
- Operators shall determine the presence of bat colonies and avoid placing turbines near known bat hibernation, breeding, and maternity/nursery colonies; in known migration corridors; or in known flight paths between colonies and feeding areas.
- Operators shall determine the presence of active raptor nests (i.e., raptor nests used during the breeding season). Measures to reduce raptor use at a project site (e.g., minimize road cuts, maintain either no vegetation or nonattractive plant species around the turbines) shall be considered.
- A habitat restoration plan shall be developed to avoid (if possible), minimize, or mitigate negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. The plan shall identify revegetation, soil stabilization, and erosion reduction measures that shall be implemented to ensure that all temporary use areas are restored. The plan shall require that restoration occur as soon as possible after completion of activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
- Procedures shall be developed to mitigate potential impacts to special status species. Such measures could include avoidance, relocation of project facilities or lay-down areas, and/or relocation of biota.
- Facilities shall be designed to discourage their use as perching or nesting substrates by birds. For example, power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching.

A.2.3 Visual Resources

- The public shall be involved and informed about the visual site design elements of the proposed wind energy facilities. Possible approaches include conducting public forums for disseminating information, offering organized tours of operating wind developments, and using computer simulation and visualization techniques in public presentations.

- Turbine arrays and turbine design shall be integrated with the surrounding landscape. Design elements to be addressed include visual uniformity, use of tubular towers, proportion and color of turbines, nonreflective paints, and prohibition of commercial messages on turbines.
- Other site design elements shall be integrated with the surrounding landscape. Elements to address include minimizing the profile of the ancillary structures, burial of cables, prohibition of commercial symbols, and lighting. Regarding lighting, efforts shall be made to minimize the need for and amount of lighting on ancillary structures.

A.2.4 Roads

- An access road siting and management plan shall be prepared incorporating existing BLM standards regarding road design, construction, and maintenance such as those described in the BLM 9113 Manual (BLM 1985) and the *Surface Operating Standards for Oil and Gas Exploration and Development* (RMRCC 1989; i.e., the Gold Book).

A.2.5 Ground Transportation

- A transportation plan shall be developed, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan shall consider specific object sizes, weights, origin, destination, and unique handling requirements and shall evaluate alternative transportation approaches. In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits shall be clearly identified.
- A traffic management plan shall be prepared for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration.

A.2.6 Noise

- Proponents of a wind energy development project shall take measurements to assess the existing background noise levels at a given site and compare them with the anticipated noise levels associated with the proposed project.

A.2.7 Noxious Weeds and Pesticides

- Operators shall develop a plan for control of noxious weeds and invasive species, which could occur as a result of new surface disturbance activities at the site. The plan shall address monitoring, education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. The use of

certified weed-free mulching shall be required. If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.

- If pesticides are used on-site, an integrated pest management plan shall be developed to ensure that applications would be conducted within the framework of BLM and DOI policies and entail only the use of EPA-registered pesticides. Pesticide use shall be limited to nonpersistent, immobile pesticides and shall only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.

A.2.8. Cultural/Historic Resources

- The BLM will consult with Indian Tribal governments early in the planning process to identify issues regarding the proposed wind energy development, including issues related to the presence of cultural properties, access rights, disruption to traditional cultural practices, and impacts to visual resources important to the tribe(s).
- The presence of archaeological sites and historic properties in the area of potential effect shall be determined on the basis of a records search of recorded sites and properties in the area and/or, depending on the extent and reliability of existing information, an archaeological survey. Archaeological sites and historic properties present in the area of potential effect shall be reviewed to determine whether they meet the criteria of eligibility for listing on the NRHP.
- When any ROW application includes remnants of a National Historic Trail, is located within the viewshed of a National Historic Trail's designated centerline, or includes or is within the viewshed of a trail eligible for listing on the NRHP, the operator shall evaluate the potential visual impacts to the trail associated with the proposed project and identify appropriate mitigation measures for inclusion as stipulations in the POD.
- If cultural resources are present at the site, or if areas with a high potential to contain cultural material have been identified, a cultural resources management plan (CRMP) shall be developed. This plan shall address mitigation activities to be taken for cultural resources found at the site. Avoidance of the area is always the preferred mitigation option. Other mitigation options include archaeological survey and excavation (as warranted) and monitoring. If an area exhibits a high potential, but no artifacts were observed during an archaeological survey, monitoring by a qualified archaeologist could be required during all excavation and earthmoving in the high-potential area. A report shall be prepared documenting these activities. The CRMP also shall: 1) establish a monitoring program, 2) identify measures to prevent potential looting/vandalism or erosion impacts, and 3) address the education of

workers and the public to make them aware of the consequences of unauthorized collection of artifacts and destruction of property on public land.

A.2.9. Paleontological Resources

- Operators shall determine whether paleontological resources exist in a project area on the basis of the sedimentary context of the area, a records search for past paleontological finds in the area, and/or, depending on the extent of existing information, a paleontological survey.
- If paleontological resources are present at the site, or if areas with a high potential to contain paleontological material have been identified, a paleontological resources management plan shall be developed. This plan shall include a mitigation plan for collection of the fossils; mitigation could include avoidance, removal of fossils, or monitoring. If an area exhibits a high potential but no fossils were observed during survey, monitoring by a qualified paleontologist could be required during all excavation and earthmoving in the sensitive area. A report shall be prepared documenting these activities. The paleontological resources management plan also shall: 1) establish a monitoring program, 2) identify measures to prevent potential looting/vandalism or erosion impacts, and 3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of fossils on public land.

A.2.10. Hazardous Materials and Waste Management

- Operators shall develop a hazardous materials management plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used at the site. The plan shall identify all hazardous materials that would be used, stored, or transported at the site. It shall establish inspection procedures, storage requirements, storage quantity limits, inventory control, nonhazardous product substitutes, and disposition of excess materials. The plan shall also identify requirements for notices to federal and local emergency response authorities and include emergency response plans.
- Operators shall develop a waste management plan identifying the waste streams that are expected to be generated at the site and addressing hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. This plan shall address all solid and liquid wastes that may be generated at the site.
- Operators shall develop a spill prevention and response plan identifying where hazardous materials and wastes are stored on-site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on-site, a procedure for

ensuring that the spill response kits are adequately stocked at all times, and procedures for making timely notifications to authorities.

A.2.11. Storm Water

- Operators shall develop a storm water management plan for the site to ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion.

A.2.12. Human Health and Safety

- A safety assessment shall be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as site access, construction, safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, and fire control.
- A health and safety program shall be developed to protect both workers and the general public during construction, operation, and decommissioning of a wind energy project. Regarding occupational health and safety, the program shall identify all applicable federal and state occupational safety standards; establish safe work practices for each task (e.g., requirements for personal protective equipment and safety harnesses; Occupational Safety and Health Administration standard practices for safe use of explosives and blasting agents; and measures for reducing occupational electric and magnetic fields [EMF] exposures); establish fire safety evacuation procedures; and define safety performance standards (e.g., electrical system standards and lightning protection standards). The program shall include a training program to identify hazard training requirements for workers for each task and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies shall be established.
- Regarding public health and safety, the health and safety program shall establish a safety zone or setback for wind turbine generators from residences and occupied buildings, roads, ROWs, and other public access areas that is sufficient to prevent accidents resulting from the operation of wind turbine generators. It shall identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or decommissioning activities. It shall also identify measures to be taken during the operation phase to limit public access to hazardous facilities (e.g., permanent fencing would be installed only around electrical substations, and turbine tower access doors would be locked).
- Operators shall consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles

per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) shall be identified and addressed in the traffic management plan.

- If operation of the wind turbines is expected to cause significant adverse impacts to nearby residences and occupied buildings from shadow flicker, low-frequency sound, or EMF, site-specific recommendations for addressing these concerns shall be incorporated into the project design (e.g., establishing a sufficient setback from turbines).
- The project shall be planned to minimize electromagnetic interference (e.g., impacts to radar, microwave, television, and radio transmissions) and comply with Federal Communications Commission regulations. Signal strength studies shall be conducted when proposed locations have the potential to impact transmissions. Potential interference with public safety communication systems (e.g., radio traffic related to emergency activities) shall be avoided.
- The project shall be planned to comply with FAA regulations, including lighting regulations, and to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.
- Operators shall develop a fire management strategy to implement measures to minimize the potential for a human-caused fire.

Monitoring Plan

The following table provides a summary of the monitoring activities that will be conducted during the project. The table is organized by activity, with columns for the activity name, the frequency of monitoring, the responsible party, and the expected outcomes. The activities are designed to ensure that the project is progressing as planned and that any potential issues are identified and addressed in a timely manner.

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APPENDIX D

Level 1: Initial assessment of project risks and opportunities.

Level 2: Ongoing monitoring of project risks and opportunities.

Level 3: Final assessment of project risks and opportunities.

The following table provides a summary of the monitoring activities that will be conducted during the project. The table is organized by activity, with columns for the activity name, the frequency of monitoring, the responsible party, and the expected outcomes. The activities are designed to ensure that the project is progressing as planned and that any potential issues are identified and addressed in a timely manner.

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Appendix D: Monitoring Plan (Page 30)

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and to be in compliance with the requirements of the law.

It is the policy of the Department to ensure that all personnel are properly trained and equipped to perform their duties.

The project shall be carried out in accordance with the following requirements:

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The project shall be carried out in accordance with the following requirements:

Operation shall be carried out in accordance with the following requirements:

Monitoring Plan

The BLM would monitor and evaluate management strategies and resource conditions and trends to determine the effectiveness of the RAMP and to ensure that its implementation is achieving the desired results. Information on resource conditions obtained through monitoring would be used to assess the effectiveness of management strategies and evaluate whether or not management should be adapted to accommodate new information, changes in demands on resources, or other considerations.

The BLM would monitor the Planning Area to quantify the number of recreational visits, types of recreational activities and use patterns, accomplishment of management objectives, and potential adverse impacts to resources and visitor experiences from recreational use. The results of the monitoring would provide an opportunity to identify actions to protect resources, enhance visitor experiences, and deal with health and safety needs in the area.

The monitoring program would include such actions as:

- Monitoring vehicle counters to observe visitation levels
- Wildlife water (guzzler) monitoring to observe wildlife use levels
- Migratory bird surveys to assess bird populations and overall ecosystem health

Monitoring would help the BLM to detect and document natural and human-induced changes in resource conditions and visitor experiences, and offer insights into the effectiveness of resource management policies and objectives. It would also help agency personnel understand what might be driving the changes requiring intervention (corrective management actions or strategies).

Land use plan monitoring is conducted in two stages. The first is to ensure that decisions are implemented in accordance with the approved RMP/ROD. This type of monitoring is conducted as RMP decisions become effective or when decisions to approve implementation-level plans or to implement site-specific projects are approved or implemented.

As stated in the BLM Land Use Planning Handbook H-1601-1, (page 33):

Implementation monitoring is the process of tracking and documenting the implementation (or the progress toward implementation) of land use plan decisions. This should be done at least annually and should be documented in the form of a tracking log or report. The report must be available for public review

(one way to accomplish this is an annual planning update which can be sent to those who participated in the planning process or have expressed an interest in receiving the report). The report should describe management actions proposed or undertaken to implement land use plan decisions and can form the basis for annual budget documents. In subsequent years, reports should document which management actions were completed and what further actions are needed to continue implementing land use plan decisions.

The next stage of monitoring is to determine whether land use plan decisions are achieving the desired effects. Effectiveness monitoring provides an empirical database on impacts of decisions and effectiveness of mitigation. Effectiveness monitoring is also useful for improving analytical procedures for future impact analyses and for designing or improving mitigation and enhancement measures.

Effectiveness monitoring is the process of collecting data and information to determine whether or not desired outcomes (expressed as goals and objectives in the land use plan) are being met (or progress is being made toward meeting them) as the allowable uses and management actions are being implemented.

A monitoring strategy must be developed as part of the land use plan that identifies indicators of change, acceptable thresholds, methodologies, protocols, and timeframes that would be used to evaluate and determine whether or not desired outcomes are being achieved. The monitoring process should collect information in the most cost-effective manner and may involve sampling or remote sensing.

Monitoring could be so costly as to be prohibitive if it is not carefully and reasonably designed. Therefore, it is not necessary or desirable to monitor every management action or direction. Unnecessary detail and unacceptable costs can be avoided by focusing on key monitoring questions and proper sampling methods. The level and intensity of monitoring would vary, depending on the sensitivity of the resource or area and the scope of the proposed management activity.

This monitoring plan is a dynamic document. Based on periodic reviews of the quality of the data collected and the usefulness of the data for making management decisions, it would be amended as necessary in order to ensure that the most important information is available to the manager for decision-making.

Table M-1 includes examples of monitoring that periodically occur within the Planning Area and outlines an approach to monitoring based on needs identified in this RAMP. Monitoring would be directed at areas in which specific and important resource values and visitor experiences could be threatened.

TABLE D-1
MONITORING TABLE FOR IMPERIAL SAND DUNES DRAFT RAMP/DRAFT EIS

Type of Monitoring	How Often?	Where Will it Take Place?	Purpose?
Colorado Desert fringe-toed lizard monitoring	As funding and staffing levels allow (individual sightings to be recorded)	Areas to be determined	To assess Colorado Desert fringe-toed lizard population levels and overall ecosystem health
Flat-tailed horned lizard sighting recordation	As sightings occur	Areas to be determined	To aid in assessment of flat-tailed horned lizard population levels and overall ecosystem health
PMV monitoring	In years when 1.82-inch rainfall threshold during October, November, and December is met	Areas to be determined	To assess PMV population levels, aid in recovery of the species, and assess overall ecosystem health
Algodones Dunes sunflower; Wiggins' croton; Other special status species monitoring	As funding and staffing levels allow	Areas to be determined	To assess Algodones Dunes sunflower, Wiggins' croton, and other special status plant populations and overall ecosystem health
Invertebrate monitoring	As funding and staffing levels allow	Areas to be determined	To assess invertebrate populations and overall ecosystem health
Mojave desert tortoise monitoring	As funding and staffing levels allow (individual sightings to be recorded)	Areas to be determined	To assess desert tortoise population levels and overall ecosystem health
Wildlife guzzler monitoring	Each year	Each documented wildlife guzzler within the Planning Area boundary	To assess proper functioning condition of the wildlife guzzler and monitor wildlife use
Microphyll woodlands migratory bird monitoring	Each spring and fall	Microphyll woodlands	To assess bird populations and overall ecosystem health
Tamarisk removal/monitoring	Each year	Each documented infestation site	To boost overall ecosystem health and eradicate an invasive species; to improve wildlife habitat

TABLE D-1
MONITORING TABLE FOR IMPERIAL SAND DUNES DRAFT RAMP/DRAFT EIS (CONT.)

Type of Monitoring	How Often?	Where Will it Take Place?	Purpose?
Wilderness monitoring	Each year	Each WA boundary in the Planning Area	To monitor activity in and around the WAs, and ensure WA objectives are being met
Law enforcement patrols/monitoring	Year-round	All BLM lands in the Planning Area	To monitor legal and illegal activity occurring in the Planning Area, stop illegal activity, and promote resource protection
Vehicle counters	Year-round	Gecko Road, Wash Road, Ogilby access road, Grays Well Road	To monitor visitor use patterns at various sites in the Planning Area
Campground monitoring	During fall/winter/spring high season use	Buttercup, Grays Well, Keyhole, Midway, Gecko, Roadrunner, and Dunebuggy Flats campgrounds	To monitor visitor use patterns at developed and primitive campgrounds in the Planning Area
Cultural resources monitoring	Year-round	All BLM lands in the Planning Area	To monitor cultural sites for visitor use and vandalism/theft
Closure boundary monitoring	Year-round	PMV closure boundaries	To monitor for incursions into the PMV critical habitat closure
Rainfall monitoring	Year-round	Remote area weather stations located at Buttercup and Cahuilla Ranger stations	To monitor rainfall amounts to see if rainfall threshold is met
Track cover density monitoring	Every 3-5 years, dependent on conditions	Throughout the Planning Area	To monitor visitor use patterns

Special Status Species

This appendix provides the methodology that would be used to monitor special status species and habitats of concern in the Planning Area, as well as visitor use patterns. Through research, monitoring, and analysis of the monitoring data, BLM would determine visitor use patterns and impacts to species and habitats of concern due to various land uses in the Planning Area, and use this information to make management changes, if necessary.

BLM would coordinate with the USFWS or other agencies to develop and implement the most up-to-date scientific approaches to monitor species.

Colorado Desert Fringe-toed Lizard

In the past, BLM has completed survey transects during spring and fall to estimate the density of Colorado Desert fringe-toed lizards (*Uma notata*) in a comparison of open and closed areas in terms of OHV recreation.

BLM anticipates monitoring for fringe-toed lizards on an as-needed basis. Monitoring may include transects and/or study plots, or another protocol to be developed, depending on best scientific methods.

Flat-tailed Horned Lizard

Data from years past appear to indicate that the flat-tailed horned lizard is less abundant in the dunes than in surrounding areas. The density and cryptic nature of flat-tailed horned lizard make full-scale monitoring ineffective in the Planning Area.

The BLM became a signatory to the Flat-tailed Horned Lizard Range-wide Management Strategy in 2003. In that document, flat-tailed horned lizard management areas were designated in the El Centro Resource Area on the East Mesa, West Mesa, and Yuha Desert. BLM does not anticipate monitoring for flat-tailed horned lizard in the ISD SRMA, but would monitor west of the ISD SRMA, in the East Mesa management area, as funding and staffing levels allow. All sightings in the Planning Area would be reported to the wildlife biologist and dates and locations would be saved in a database as to better understand their range and habitat use.

Mojave Desert Tortoise

While Mojave desert tortoise are not known to occur regularly in the Planning Area, they are known to regularly occur (although at a very low density) in the area east of the Planning Area. Monitoring for Mojave desert tortoise is anticipated to occur during or

before each ground disturbing project that takes place in or adjacent to documented desert tortoise habitat in the Planning Area.

BLM does not anticipate monitoring for Mojave desert tortoise in the Planning Area on an annual basis, but would monitor at the project level in order to prevent take of desert tortoises.

Special Status Plant Monitoring and Management

The ISD supports numerous dune-endemic plants. Species whose distribution is restricted to the dunes or whose status indicates that special management is necessary to ensure the ongoing persistence of the species are of special interest. These species include:

- PMV (*Astragalus magdalenae* var. *peirsonii*)—Federally Listed as Threatened
- Algodones Dunes sunflower (*Helianthus niveus* spp. *tephrodes*)—State Rare
- Wiggins' croton (*Croton wigginsii*)—State Rare

PMV would receive the highest level of priority, since this species was federally listed as threatened primarily due to threats posed by OHV activity. The monitoring and research pertaining to PMV would provide information that may be useful in managing all target plant and animal species in the dunes.

Peirson's Milk-vetch Monitoring

The frequency of full-scale monitoring would correspond to years in which adequate precipitation occurs between October and December. The rationale for reducing the frequency of monitoring to good-rainfall years (above the 1.82-inch threshold) is that the abundance of PMV in any spring is highly correlated with the amount of rainfall in the growing season immediately preceding that spring (Willoughby 2001). Between wetter years, the PMV population declines as plants die and are not replaced due to lack of germination. Monitoring during poor rainfall years could result in a lower encounter rate for PMV plants that is not reflective of the species' status. Monitoring during poor rainfall years could, however, provide information concerning the persistence of adult plants and the relative importance of these plants to seed bank contributions.

Sampling methodology

The type/method of sampling PMV would depend largely on the extent of the germination event that triggers it. In years where the monitoring threshold is not met, BLM does not expect to implement a full-scale monitoring effort. In these years, BLM would implement a smaller scale, less formal monitoring regime to get a feel for the

conditions on the ground, the numbers of PMV germinating, if any, and the areas where germination is occurring. The type of monitoring implemented each year would be based on precipitation levels, funding availability, and staffing availability.

Should there be a large amount of rainfall (much greater than the 1.82-inch monitoring threshold), and an extensive germination event occurs, it is possible that BLM would monitor for such information as PMV density or seed bank estimates. This could be accomplished through monitoring of belt transects (long, narrow quadrats), which are accepted as the best way to monitor for a plant that is often found in clumps, as PMV often is found, or other widely accepted sampling methods. Return trips to transects monitored in 2005, 2006, and 2007 could also provide valuable data and may also be employed. The numbers of transects and locations of transects would be determined each year that monitoring is implemented to ensure that the highest quality data is collected.

The following information may be collected for PMV: (1) total number of individuals observed; (2) number of flowering individuals; (3) number of non-flowering individuals; (4) number of individuals older than 1 year (this can be determined by the presence of basal leaf/branch scars); (5) number of individuals with apparent physical damage from OHVs; and (6) number of individuals with damage from other sources (e.g., insects).

Other Special Status Plant Monitoring

Other special status plants in the Planning Area, including Algodones Dunes sunflower and Wiggin's croton are of special interest because their distribution is largely restricted to the ISD, and because they are listed as rare by the CDFG.

BLM would monitor these species as funding and staffing levels allow.

Invertebrate Inventory/Monitoring

The Planning Area is home to several endemic invertebrates, and invertebrate inventory results from the 2008 and 2009 field season indicated that over 1,000 species of invertebrates occur in the Planning Area.

The BLM would continue inventory/monitoring for invertebrates as funding and staffing levels allow.

Precipitation Monitoring

Long-term weather stations in the region do not completely capture the actual growing season precipitation occurring in the dunes. These weather stations are some distance

from the Planning Area, the seasonal precipitation totals vary greatly between stations, and there is strong indication that precipitation varies considerably within the Planning Area during the same growing season (Willoughby 2000 and 2001). For these reasons, two remote area weather stations (RAWS) were set up in the Planning Area in fall 2000, one at the Cahuilla Ranger Station in the northwest part of the Planning Area and one at Buttercup Campground in the southern part of the Planning Area. These stations began collecting weather data on November 16, 2000. It is not uncommon for the Cahuilla Ranger Station RAWS to collect differing amounts of rainfall than the Buttercup Ranger Station RAWS. Because of this variability and the importance of precipitation in controlling the abundance of special status plants, the Colorado Desert fringe-toed lizard, and the flat-tailed horned lizard, more weather stations are necessary to enable good interpretation of the monitoring data collected.

The BLM would monitor rainfall to assess the likelihood of PMV germination, and to determine whether the rainfall threshold is met (1.82 inches of rainfall during the months of October, November and December) that would trigger the closure of the Dunebuggy Flats campground. The closure of the Dunebuggy Flats campground in high rainfall years would add an additional layer of protection to allow PMV to germinate and set seed, thereby aiding in recovery of the species.

Precipitation data gathered by the RAWS would be compared to the results of monitoring to assist in determining whether a detected increase in the population of PMV species can be solely attributable to precipitation variability.

Recreation Monitoring

OHV recreation levels and identification of high density areas would be estimated by means of several methods: vehicle counters, visitor surveys, and aerial photography.

There are currently seven vehicle counters placed throughout the Planning Area at Gecko Road, Glamis Flats, Osborne Overlook, Wash Road, Buttercup, Dunebuggy Flats, and Ogilby. The vehicle counters are used to estimate visitation levels at campgrounds throughout the Planning Area. The BLM would continue to monitor each vehicle counter. Counters would be monitored more often during the high use season (October through April), and less often during the summer months when visitation slows dramatically.

The BLM, along with other management partners, routinely engage ISD visitors through visitor surveys to ascertain patterns, preferences, and demographics, and also routinely perform fee compliance checks in campgrounds throughout the SRMA. These monitoring efforts are used to ascertain visitation levels, and to monitor fee compliance throughout the SRMA. The BLM would continue to conduct demographic studies to obtain data on the willingness-to-pay and actual expenditure data by OHV recreation

visitors under different management regimes. These elements respond to the need to account for the economic impact of OHV recreation visitors on local and regional communities.

BLM law enforcement and recreation staffs routinely patrol the Planning Area, most often during the high use season. Law enforcement and recreation staffs monitor closure boundaries for compliance, and law enforcement rangers issue citations to violators. BLM staff would continue to monitor closure boundaries for compliance.

In past years, BLM has also obtained aerial photos to use as a tool to monitor visitor use patterns. Air photo transects were established in 1998 throughout the Planning Area to obtain a sample of the distribution and intensity of OHV recreation through the measurement of vehicle tracks. Because of the ephemeral nature of vehicle tracks in sand, it is necessary to take the photographs during a weekend of relatively high vehicle use. Aerial photographs would be sampled by means of a grid of points to estimate the cover of vehicle tracks. The size of the grid and number of points per transect would be determined based on the sampling objectives. OHV recreation data would be used to make inferences concerning the effects of different levels of OHV recreation on particular species. The photographic information collected would be used to assess changes in OHV recreation levels and OHV recreation patterns.

Comparative Evaluation between Peirson's Milk-vetch and OHV Recreation Surveys

In the past, BLM has compared PMV abundance to OHV recreation surveys through the use of both PMV density surveys and aerial photography-aided OHV recreation surveys.

As described in the PMV monitoring section, belt transects have been established. These transects would subsequently be identified on aerial photographs developed for OHV monitoring. PMV abundance would be compared to OHV recreation levels. The correlative studies described above allow inferences to be made regarding effects of OHVs on PMV.

Microphyll Woodland Migratory Bird Surveys

BLM has performed migratory bird point counts in the microphyll woodland habitats on the east side of the Planning Area for several years. Over 100 species have been identified during these surveys, and have served as a good indicator of overall ecosystem health.

The BLM would continue monitoring bird populations in the microphyll woodlands as funding and staffing levels allow. Monitoring would be conducted in accordance with variable circular plot protocols.

Wildlife Guzzler Monitoring

There are six wildlife guzzlers in the Planning Area, with plans for installation of additional wildlife guzzlers in the future. BLM staff regularly visits these wildlife guzzlers to assess proper functioning condition and to monitor wildlife use.

BLM would continue to monitor these wildlife guzzlers as funding and staffing levels allow.

Invasive Species Monitoring

Due to the rapid spread of certain invasive species, it has become necessary in recent years to monitor for infestations in the Planning Area. The two most common invasive species in the planning area are tamarisk or salt cedar (*Tamarix* spp.) and Sahara mustard (*Brassica tournefortii*).

BLM would continue to monitor for invasive species throughout the planning area, and perform removal/treatment of these species as funding and staffing levels allow, with a priority on removal from the North Algodones Dunes WA.

Wilderness Area Monitoring

BLM would continue to monitor recreational activity in the North Algodones Dunes WA, as well as monitor the WA boundary for incursions.

Law Enforcement Patrol/Monitoring

BLM would continue to patrol and monitor all areas of the Planning Area as part of law enforcement ranger duties. Special emphasis may be put on high use visitor areas, as well as closure boundaries (WA boundary, PMV critical habitat boundary) to enforce said closure boundaries to the best of BLM's ability.

Cultural Resources Monitoring

The BLM currently requires all ground-disturbing activities in the Planning Area to undergo a cultural resource survey before any ground disturbance may take place. BLM would continue this policy to avoid disturbance to cultural resources whenever possible.

In addition, periodic monitoring of cultural resources within the Planning Area, especially those in high use areas, would continue as part of the cultural resource program.

Wildlife Gullyer Monitoring

There are six wildlife gullies in the Planning Area with plans for installation of additional wildlife gullies in the future. BLM will continue to monitor these wildlife gullies to ensure proper functioning condition and to ensure proper use.

BLM would continue to monitor these wildlife gullies for nesting and roosting levels.

Invasive Species Monitoring

Due to the rapid spread of invasive species in the Planning Area, BLM is required to monitor for invasive species in the planning area and remove or control them. Invasive species include the Norway spruce (Picea canadensis), the European larch (Larix laricina), and the European spruce (Picea abies).

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BLM would continue to monitor for invasive species throughout the planning area, and remove or control them. Invasive species include the Norway spruce (Picea canadensis), the European larch (Larix laricina), and the European spruce (Picea abies).

Wilderness Area Monitoring

BLM would continue to monitor recreational activity in the North Agapocum District WA, as well as monitor the WA boundary for wilderness.

Law Enforcement Patrol/Monitoring

BLM would continue to patrol and monitor all areas of the Planning Area as part of law enforcement ranger duties. Special emphasis may be put on high use areas, such as wilderness boundaries (WA boundary, PMV official habitat boundary) to enforce and enforce boundaries to the best of BLM's ability.

Cultural Resources Monitoring

The BLM currently requires all projects affecting the Planning Area to undergo a cultural resources survey before any ground disturbance may take place. BLM would continue the policy to avoid disturbances to cultural resources whenever possible.

In addition, ongoing monitoring of cultural resources within the Planning Area, especially those in high use areas, would continue as part of the cultural resource program.

Rainfall Threshold Rationale

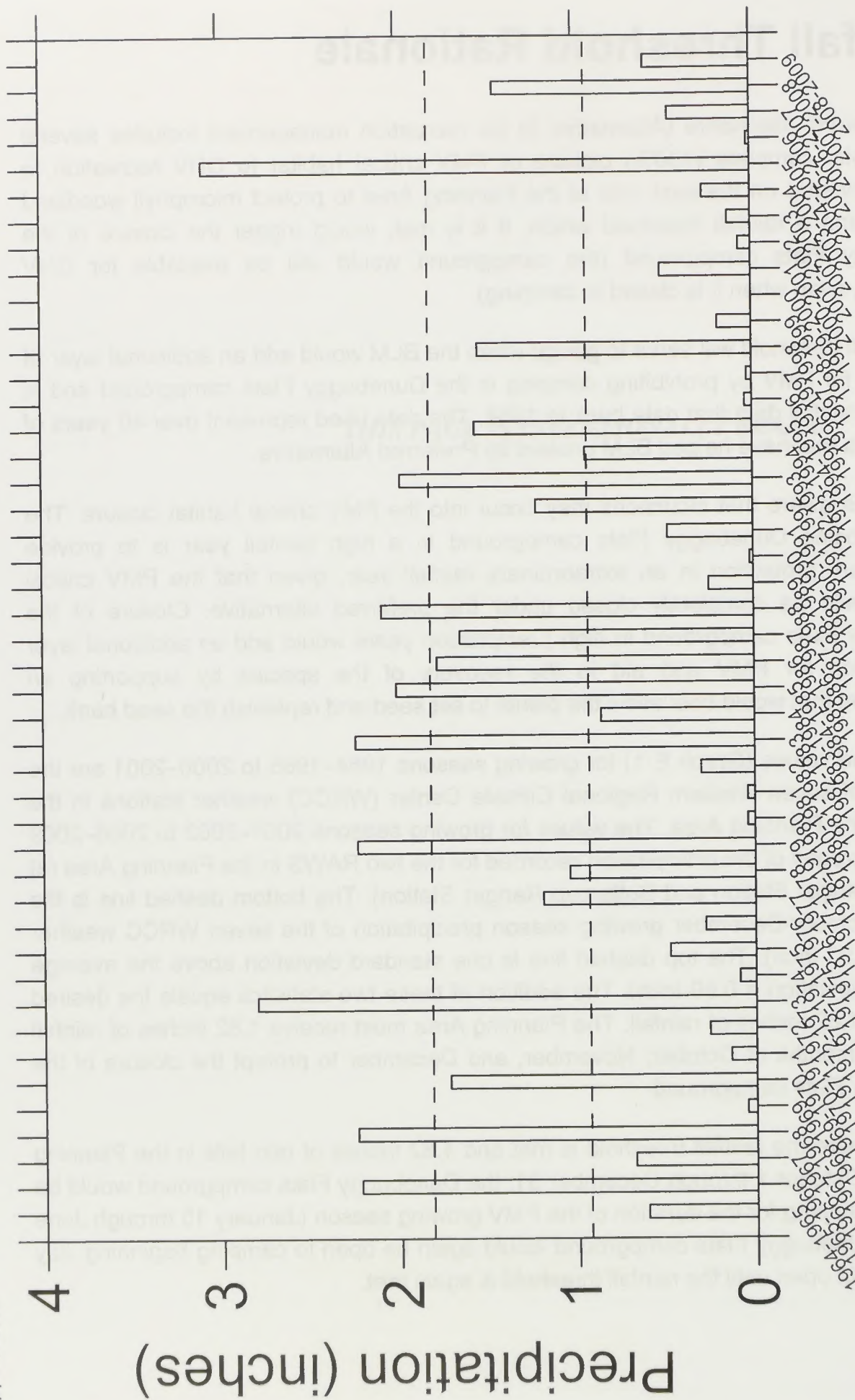
The Preferred Alternative (Alternative 8) for recreation management includes several components: complete (100%) closure of PMV critical habitat to OHV recreation, a camping closure on the east side of the Planning Area to protect microphyll woodland habitats, and a rainfall threshold which, if it is met, would trigger the closure of the Dunebuggy Flats campground (the campground would still be available for OHV recreation, even when it is closed to camping)

The rainfall threshold will serve to gauge when the BLM would add an additional layer of protection for PMV by prohibiting camping in the Dunebuggy Flats campground and is based on rainfall data that date back to 1964. The data used represent over 40 years of rainfall data that have helped BLM present its Preferred Alternative.

The BLM is aware that incursions may occur into the PMV critical habitat closure. The goal in closing Dunebuggy Flats campground in a high rainfall year is to provide extraordinary protection in an extraordinary rainfall year, given that the PMV critical habitat would be completely closed under the preferred alternative. Closure of the Dunebuggy Flats campground in high precipitation years would add an additional layer of protection for PMV and aid in the recovery of the species by supporting an environment that would best allow the plants to set seed and replenish the seed bank.

Precipitation values (Graph E-1) for growing seasons 1964–1965 to 2000–2001 are the averages of seven Western Regional Climate Center (WRCC) weather stations in the vicinity of the Planning Area. The values for growing seasons 2001–2002 to 2008–2009 are the averages of the precipitation recorded for the two RAWS in the Planning Area (at Cahuilla Ranger Station and Buttercup Ranger Station). The bottom dashed line is the average October-December growing season precipitation of the seven WRCC weather stations (0.93 inch). The top dashed line is one standard deviation above the average (standard deviation = 0.89 inch). The addition of these two statistics equals the desired threshold, 1.82 inches of rainfall. The Planning Area must receive 1.82 inches of rainfall during the months of October, November, and December to prompt the closure of the Dunebuggy Flats campground.

In years where the rainfall threshold is met and 1.82 inches of rain falls in the Planning Area from October 1 through December 31, the Dunebuggy Flats campground would be closed to camping for the duration of the PMV growing season (January 15 through June 30). The Dunebuggy Flats campground would again be open to camping beginning July 1 and remain open until the rainfall threshold is again met.



October-December Growing Season

Graph E-1. Precipitation Values for PMV Growing Seasons 1964-1965 through 2008-2009

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APPENDIX F
ALTERNATIVES COMPARISON TABLES

Renewable Energy	Alternative							
	1	2	3	4	5	6	7	8
Geothermal (BLM acres)								
Acres available for Geothermal Leasing	188,832	188,832	0	0	11,939	11,939	188,832	35,115
Acres available for geothermal leasing (no surface occupancy)	0	0	0	188,832	0	0	0	14,025
Acres closed to geothermal leasing (outside of WA)	0	0	188,832	0	176,894	176,894	0	139,691
Acres closed to surface occupancy (WA)*	26,098	26,098	26,098	26,098	26,098	26,098	26,098	26,098
% of Planning Area Available for geothermal leasing (with or without surface occupancy)	87.9%	87.9%	0%	87.9%	5.5%	5.5%	87.9%	22.8%
Solar Energy (BLM acres)								
Acres available for solar energy development	188,832	188,832	47,131	39,694	39,694	39,694	188,832	35,115
Acres excluded from solar energy development (outside of Wilderness)	0	0	141,702	4,847	4,847	4,847	0	153,717
Acres excluded from solar energy development (In wilderness) *	26,098	26,098	26,098	26,098	26,098	26,098	26,098	26,098

APPENDIX F
ALTERNATIVES COMPARISON TABLES (CONT.)

Renewable Energy (cont.)	Alternative							
	1	2	3	4	5	6	7	8
Solar Energy (BLM acres) (cont.)								
Acres of avoidance for solar energy development (outside of Wilderness)	0	0	0	144,290	144,290	144,290	0	0
% of total Planning Area Available for solar development	87.9%	87.9%	22%	18.5%	18.5%	18.5%	87.9%	16.3%
Wind Energy (BLM acres)								
Acres available for wind energy development	188,832	188,832	47,131	39,694	39,694	39,694	188,832	35,115
Acres excluded from wind energy development (outside of Wilderness)	0	0	141,702	4,847	4,847	4,847	0	153,717
Acres excluded from wind energy development (In wilderness) *	26,098	26,098	26,098	26,098	26,098	26,098	26,098	26,098
Acres of avoidance from wind energy development (outside of Wilderness)	0	0	0	144,290	144,290	144,290	0	0
BLM-Administered Planning Area Acres	214,930	214,930	214,930	214,930	214,930	214,930	214,930	214,930
% of total Planning Area Available for wind energy development	87.9%	87.9%	22%	18.5%	18.5%	18.5%	87.9%	16.3%

*These lines are informational—not decisive—decisions on management of wilderness areas are made by the US Congress.

APPENDIX F
ALTERNATIVES COMPARISON TABLES (CONT.)

Recreation	Alternative							
	1	2	3	4	5	6	7	8
	OHVs (BLM acres)							
Open To OHV	120,393	87,713	74,676	105,843	103,838	108,914	125,710	127,416
Closed to OHV (outside of Wilderness)	0	49,224	61,680	29,122	32,516	27,441	10,645	9,046
Closed to OHV (Wilderness)*	26,098	26,098	26,098	26,098	26,098	26,098	26,098	26,098
Seasonal Closure	-	-	-	1,391	-	-	-	-
BLM-Administered Planning Area Acres	214,930	214,930	214,930	214,930	214,930	214,930	214,930	214,930
% of total Planning Area Closed to OHV	12%	35%	41%	26% (with seasonal closure)	27%	25%	18%	16%
% of Riding Area (% of Planning Area outside of Wilderness) Closed to OHV	0%	23%	29%	14% (with seasonal closure)	15%	13%	5%	4%
	Vehicle Camping (BLM acres)							
Available for Vehicle Camping	188,832	139,609	126,842	159,400	156,006	161,081	177,877	167,154
Closed to Vehicle Camping Only (Outside of Wilderness)	0	49,224	61,990	29,433	32,827	27,752	10,956	20,547
Closed to Vehicle Camping in high rainfall years (Outside of Wilderness)	0	0	0	0	0	0	0	1,132
North Algodones Dunes Wilderness—Closed to Vehicle Camping	26,098	26,098	26,098	26,098	26,098	26,098	26,098	26,098
BLM Planning Area Acres	214,930	214,930	214,930	214,930	214,930	214,930	214,930	214,930
% of ISDRA available for Camping	88%	65%	59%	74%	73%	75%	83%	78%

APPENDIX F
ALTERNATIVES COMPARISON TABLES (CONT.)

Recreation (cont.)	Alternative							
	1	2	3	4	5	6	7	8
	Peirson's Milk-vetch							
PMV CH Open	9,046	2,275	0	2,538	0	5,271	3,394	0
PMV CH Closed (outside of Wilderness)	0	6,772	9,046	5,499	9,046	3,775	5,652	9,046
PMV CH closed (within wilderness, closed by Congress) *	2,845	2,845	2,845	2,845	2,845	2,845	2,845	2,845
PMV CH Seasonal Closure	-	-	-	1,009	-	-	-	-
Total PMV Acres	11,891	11,891	11,891	11,891	11,891	11,891	11,891	11,891
% CH Closed	24%	81%	100%	79%	100%	57%	71%	100%
	Microphyll Woodland (BLM acres)							
Microphyll Closed to OHV and Camping	6,685	12,146	14,355	13,016	12,393	10,160	6,685	6,685
Microphyll Closed to camping only	0	0	0	0	0	0	0	4,485
Total Microphyll Woodland Acres	21,992	21,992	21,992	21,992	21,992	21,992	21,992	21,992
% Microphyll Woodland Closed	30%	55%	65%	59%	56%	46%	30%	50%

*These lines are informational—not decisive—decisions on management of wilderness areas are made by the US Congress.

Report on Selected Algodones Dunes Insects

by

Lynn S. Heydon

Robert Museum of Entomology, University of California, Davis

In September, the Biology Division of Entomology initiated a status review of 19 Algodones Dunes Insect taxa working to an Assistance Agreement (BAA031001/BAA06042) issued under the Humboldt Cooperative Agreement for the Californian Cooperative Invertebrate Unit (CESU). Hereafter, the 19 insects are referred to as "CESU insects" for brevity, although some were thought to be endemic to the Algodones Dunes and referred to as "CESU insects". The information is organized in the form of data sheets for each species, which include (a) taxonomy, (b) collection localities, (c) known or suspected distributions, (d) life history, (e) habitat requirements (including vegetation associations and factors or suspected host plants), (f) population status and trend, and (g) conservation status. A change in distribution map has been compiled for each species based on published and unpublished data and museum specimens.

APPENDIX G

In the process of gathering this information we encountered a number of species that need to be discussed as well. All of the species covered in this study are listed in Table 1, which gives their scientific names and what we know of their natural history. We discovered that two of the CESU insects (*Chrysomelids* *Imperialia* Stanley and *Dorymulla* Mickle) are not endemic to the Dunes, but are much more widespread. Six additional species were found to be endemic to the Dunes and one genus of a beetle was found nowhere else; these are discussed in Section 2. In Section 3, we have included information on non-CESU species that have been described in Wikipedia.org and Wikipedia.com, as endemic to the Algodones Dunes but are in fact much more widespread. We have both trouble to see some individuals of some species as a result we have no photographs of the following species: *Agave* *varius* Carter, *Efferia* *macrophysa* Forbes, all *Pezomachus* species, *Chrysomelids* *Imperialia* Stanley, *T. r. Imperialia* Stanley and *T. r. punctata* Pierce.

This study was made possible by the cooperation of a number of scientists, museums and collectors who have provided data was compiled from collections in the Robert Museum of Entomology, University of California, Davis (S. L. Heydon); California Academy of Sciences, San Francisco (B. Paine); California State Anthropod Museum, California Department of Food and Agriculture, Sacramento (CDEA) (S. Gaiman); Entomology Research Museum, University of California, Berkeley (J. Yanagita); Long Museum, University of California, Berkeley (S. L. Heydon); Natural History Museum of Los Angeles (W. Nix). Additional specimens were provided by: J. Paine (The State University), Logan, Donald Stanley (Clemson University), J. Paine (American Museum of Natural History), Charles Bellamy (CDEA) (CDEA).

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July 1, 2007

Report on Selected Algodones Dunes Insects

by

Lynn S. Kimsey

Bohart Museum of Entomology, University of California, Davis

In September, the Bohart Museum of Entomology initiated a status review of 19 Algodones Dunes insect taxa pursuant to an Assistance Agreement (BAA033001/BAA06044) issued under the umbrella Cooperative Agreement for the Californian Cooperative Ecosystems Unit (CESU). Hereafter, the 19 insects included in this CESU project list (most of which were thought to be endemic to the Algodones Dunes) are referred to as “CESU insects”. The information is organized in the form of data sheets for each species, which include (a) taxonomy, (b) collection localities, (c) known or inferred distribution, (d) life history, (e) habitat requirements (including vegetation associations and known or suspected host plants), (f) population status and trend, and (g) sensitivity to habitat change or disturbance. In addition, a distribution map has been compiled for each species based on published collection information and museum specimens.

In the process of gathering this information we encountered a number of species that need to be discussed as well. All of the species covered in this study are listed in Table 1, which gives their endemic status and what we know of their natural history. We discovered that two of the CESU insects (*Dasymutilla imperialis* Manley and *Dasymutilla nocturna* Mickel) are not endemic to the Dunes, but are much more widespread. Six additional species were found to be endemic to the Dunes and one genus of tiphiid wasp is found nowhere else; these are discussed in Section 2. In Section 3, we have included information on non-CESU species that have been described in Wikipedia.org and AllExperts.com, as endemic to the Algodones Dunes but are in fact much more widespread. We have been unable to see representatives of some species as a result we have no photographs of the following species: *Apiocera warneri* Cazier, *Efferia macroxipha* Forbes, all *Perdita* species, *Trigonoscuta rothi algodones* Pierce, *T. r. imperialis* Pierce and *T. r. punctata* Pierce.

This study was made possible by the cooperation of a number of scientists, museums and collection managers. Specimen data was compiled from collections in the Bohart Museum of Entomology, University of California, Davis (S. L. Heydon); California Academy of Sciences, San Francisco (N. Penny); California State Arthropod Museum, California Department of Food and Agriculture, Sacramento (CDFA) (S. Gaimari); Entomology Research Museum, University of California, Riverside (D. Yanega); Essig Museum, University of California, Berkeley (S. Barr), and Natural History Museum of Los Angeles (W. Xie). Additional specimen information was provided by James Pitts (Utah State University), Logan, Donald Manley (Clemson University), James M. Carpenter (American Museum of Natural History), Charles Bellamy (CDFA) and Eric Fisher (CDFA).

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Order HYMENOPTERA

Algodones Perdita
***Perdita algodones* Timberlake**
 (Hymenoptera: Andrenidae)

Taxonomy

Perdita algodones Timberlake 1980:26. Holotype male; California: Imperial Co., 3.5 mi. northwest Glamis (types are deposited in the California Academy of Sciences, San Francisco, on permanent loan from the University of California, Riverside).

Diagnostic features

According to Timberlake (1980) this species is closest to *Perdita pectidis* Cockerell. It differs from that species by the more closely punctured and hairier frons and mesoscutum, the whitish wings, and different markings on the abdomen. Body length is 4-4.5 mm.

Collection localities/distribution

CALIFORNIA: Imperial Co., 3.5 mi. northwest Glamis, 1 mi. west Glamis, 3 mi. west Glamis. The species is known from the type series, which was collected in April.

Natural history

Nest sites. Unknown. However, where known *Perdita* species nest in the ground.

Nectar plants. Unknown, but *Perdita* species are nectar and pollen host plant specific.

Habitat requirements. The species is only recorded from the Algodones Dunes.

Collecting techniques. Hand-netting, malaise trap, yellow bowls.

Population status

Unknown.

Sensitivity to disturbance

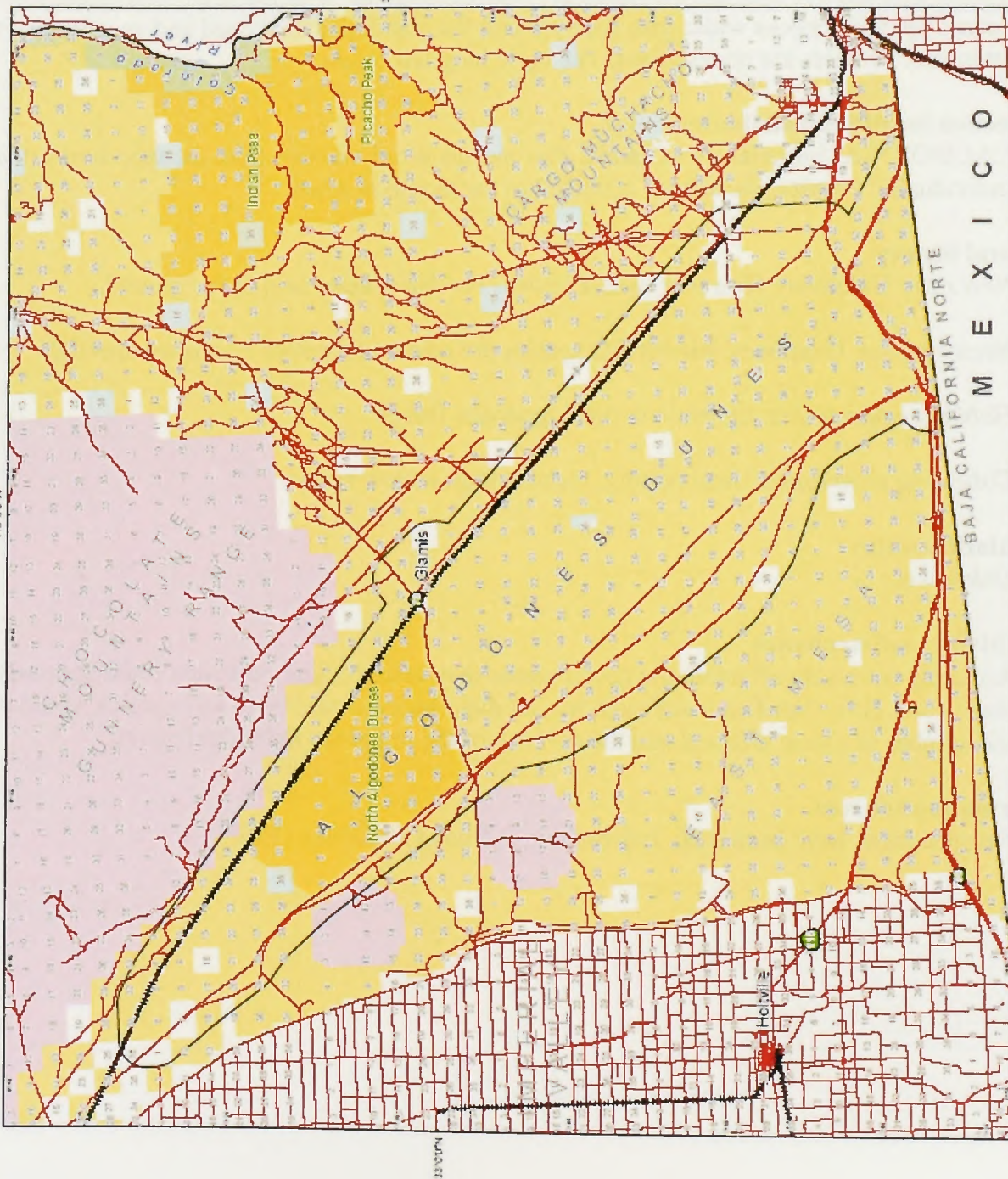
Anything adversely affecting the nectar plants they visit, or their nest sites could seriously impact these bees. How significant any such habitat disturbance would be to this species would depend on the number of plants affected and the severity of the impact to individual plants.

Information sources

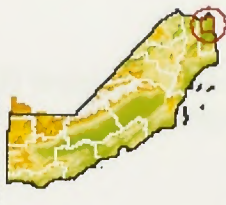
No specimens have been seen. Information is from Timberlake (1980).

Distribution Map for Algodones Perdita, *Perdita algodones*

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BLM



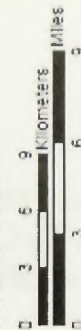
Location



Legend

- > Perdita algodones
- Algodones Dunes Boundary
- California State Line
- Federal Wilderness
- SLM
- Land Ownership
- Bureau of Land Management
- Forest Service
- National Park Service
- Bureau of Reclamation
- US Fish and Wildlife Service
- Military
- State Lands
- County / City / Regional
- Unclassified

Scales 1:50,000



Map Source



U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT
California State Office
Sacramento, California
4001 J Street, Suite 200
www.blm.gov
Data Prepared: 5/01/2007
Project: 02_perdita_algodones_20070815.dwg

Distribution map of *Perdita algodones*.

Glamis Perdita
***Perdita glamis* Timberlake**
 (Hymenoptera: Andrenidae)

Taxonomy

Perdita glamis Timberlake 1980:16. Holotype male; California: Imperial Co., Glamis (types are deposited in the California Academy of Sciences, San Francisco, on permanent loan from the University of California, Riverside).

Diagnostic features

This is a distinctive species; the males are macrocephalous, with the head often greatly broadened anteriorly, with cheeks wider than the eyes and the mandibles thickened and apically incurved and attenuate. Females are undescribed. The body length is 5 mm.

Collection localities/distribution

CALIFORNIA: Imperial Co.: Glamis. The species is only known from the type series (two individuals). *Perdita glamis* was collected in the month of June.

Natural history

Nest sites. Unknown. However, where known *Perdita* species nest in the ground.

Nectar plants. Unknown, but *Perdita* species are nectar and pollen host plant specific.

Habitat requirements. Endemic to the Algodones Dunes.

Collecting techniques. Hand netting, malaise trap, yellow bowls.

Population status

Unknown.

Sensitivity to disturbance

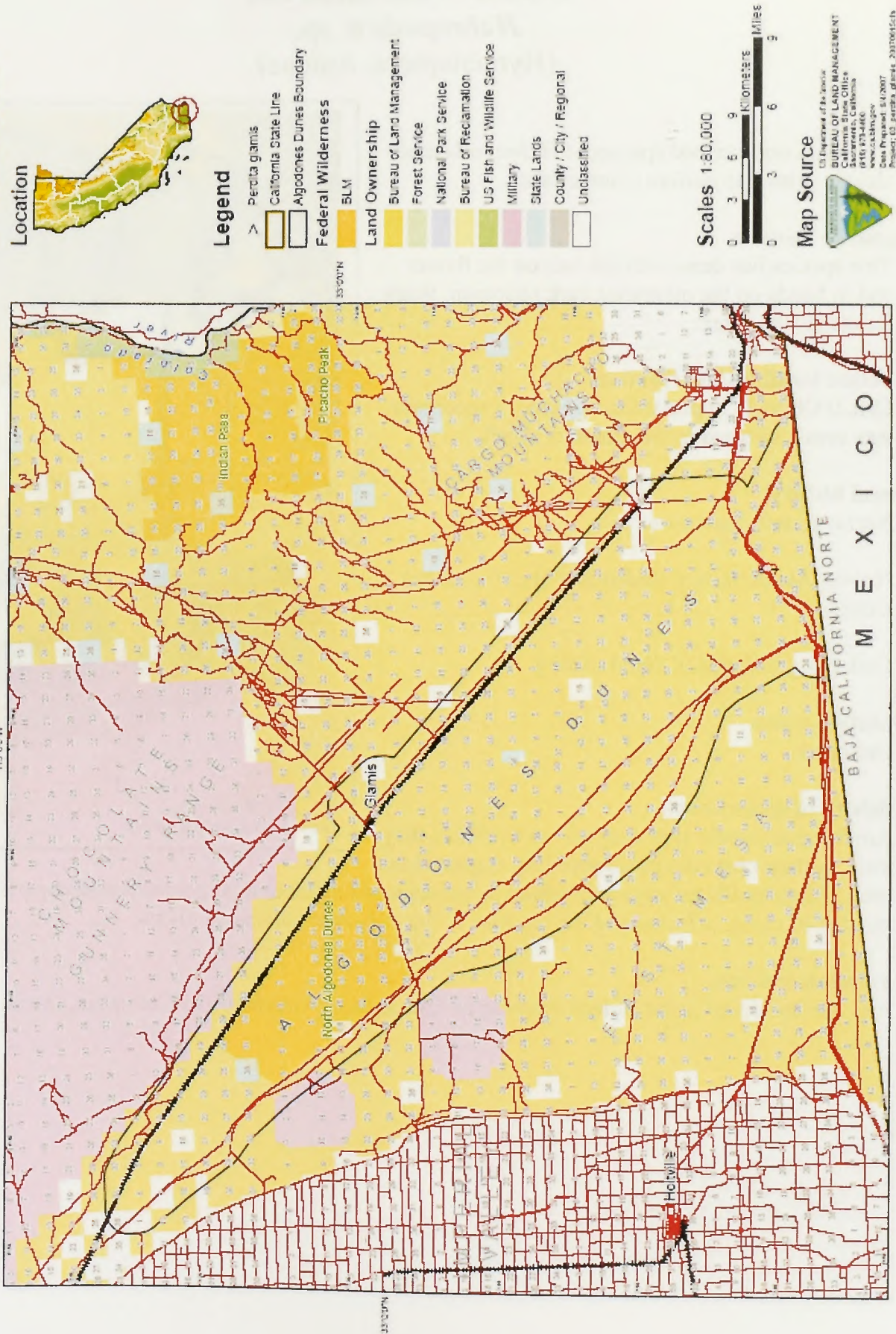
Anything adversely affecting the nectar plants they visit, or their nest sites could seriously impact these bees. How significant any such habitat disturbance would be to this species would depend on the number of plants affected and the severity of the impact to individual plants.

Information sources

No specimens have been seen. Information is from Timberlake (1980).

Distribution Map for Glamis Perdita, *Perdita glamis*

A2007D



Distribution map of *Perdita glamis*.

Glamis White-faced Bee

Habropoda n. sp.

(Hymenoptera: Apidae)

Taxonomy

This is an undescribed species of *Habropoda* most closely related to *pallida* (Timberlake).

Diagnostic features

This species has dense whitish hair on the thorax and in bands on the otherwise dark abdomen. Body length is 10-12 mm.

Collection localities/distribution

CALIFORNIA: Imperial Co.: Glamis; 1 specimen was seen, collected in the month of April.

Natural history

Nectar plants. Unknown.

Habitat requirements. Endemic to the Algodones Dunes.

Collecting techniques. Hand netting.

Population status

Unknown.

Sensitivity to disturbance

Anything adversely affecting the nectar plants they visit, or their nest sites could seriously impact these bees. How significant any such habitat disturbance would be to this species would depend on the number of plants affected and the severity of the impact to individual plants.

Information sources:

A single specimen in the Bohart museum of Entomology, University of California, Davis.

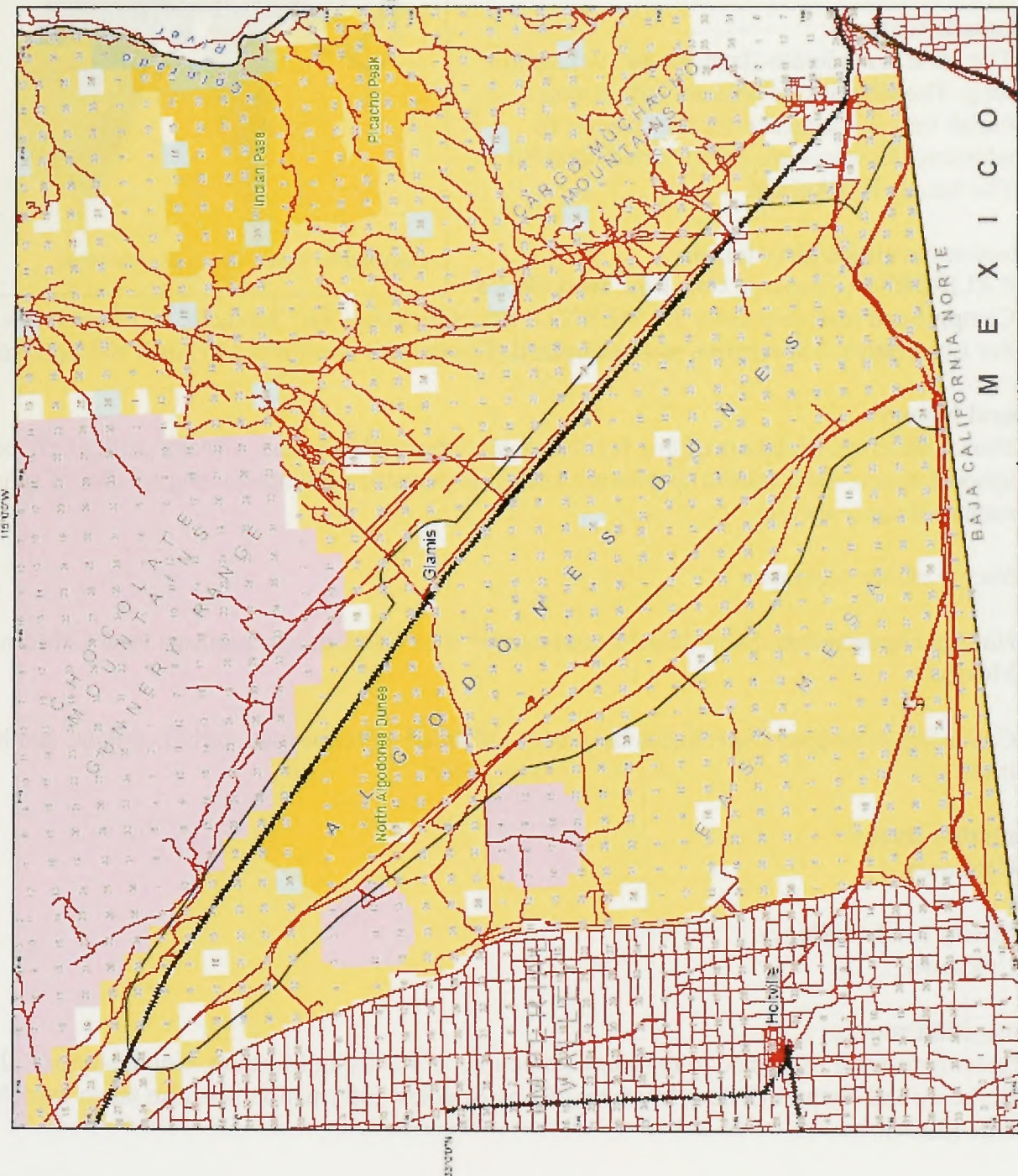


Habropoda n. sp., side view.

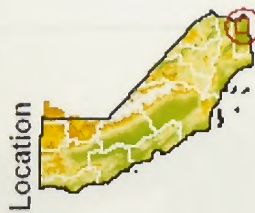


Habropoda n. sp., top view.

Distribution Map for Glamis White-faced Bee, *Habropoda n. sp.*



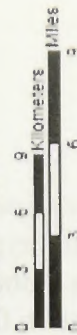
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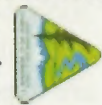
Legend

- > *Habropoda n. sp.*
- California State Line
- Algodones Dunes Boundary
- Federal Wilderness
 - SLM
- Land Ownership
 - Bureau of Land Management
 - Forest Service
 - National Park Service
 - Bureau of Reclamation
 - US Fish and Wildlife Service
 - Military
 - State Lands
 - County / City / Regional
 - Unclassified

Scales 1:50,000



Map Source



U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT
1515 W. 9th Street
Sacramento, California
(916) 637-4466
www.blm.gov
Data Prepared: 6/20/07
Project: CO-04000000-00-20070615-00

Imperial Night Mutillid
***Dasymutilla imperialis* Manley & Pitts**
 (Hymenoptera: Mutillidae)

Taxonomy

Dasymutilla imperialis Manley & Pitts
 2004:647 Holotype male; California: Imperial Co., Glamis Dunes, 1 mi. west Glamis (types are deposited in the USDA-ARS Bee Biology and Systematics Laboratory).

Diagnostic features

The male is moderate-sized, about 10-12 mm long. The all black coloration, with strong bluish tints is diagnostic for the species. In addition, the wings are darkly tinted blackish. The female is unknown.

Collection localities/distribution

CALIFORNIA: Imperial Co., 1 mi. west Gecko Campground road near Hwy 78; MEXICO: Baja California Sur: Santiago, 30 km east Las Barracas, Sur Los Frailes; 8 specimens were examined. The species is collected in April and September.



Dasymutilla imperialis, male, side view.

Natural history

Host. Unknown. Members of this family are all parasitoids on other insects, particularly bees and sphecid wasps. *Dasymutilla* species are known to parasitize ground-nesting species of sphecid wasp, such as *Bembix* species.

Nectar plants. Unknown

Habitat requirements. Sand dunes from Imperial Co., California to southern Baja California Sur, Mexico.

Collecting techniques. Specimens have been collected in yellow pan, pitfall, malaise and black light traps.

Population status

Unknown.

Sensitivity to disturbance

Unknown.

Information sources

Specimens were examined in museum collections of the Essig Museum, University of California, Berkeley and Natural History Museum of Los Angeles. Information was also taken from Manley and Pitts (2004).

2007 WTB



Nocturnal *Dasymutilla*

Dasymutilla nocturna Mickel

(Hymenoptera: Mutillidae)

Taxonomy

Dasymutilla nocturna Mickel 1928:279. Holotype female; California: Imperial Co., Andrade, Colorado Sand Desert (types deposited in the University of Minnesota and Cornell University).

Dasymutilla paranocturna Barr & Hurd 1947:21. Holotype female; California: San Bernardino Co., 5 mi northeast Yermo (type deposited in the California Academy of Sciences). Synonymized by Manley 1999.

Dasymutilla subhyalina Mickel 1928:21. Holotype male; California: Imperial Co., Andrade (type in the University of Minnesota). Synonymized by Manley 1999.

Diagnostic features

The most distinctive feature of this species is the black and white coloration in both sexes. Males are winged, females are wingless. These wasps are 9-13 mm long.

Collection localities/distribution

USA: ARIZONA: Yuma Co.: Yuma; CALIFORNIA: Imperial Co., Glamis, 2.5 mi ne Glamis, 6 mi w Glamis, 3 mi n Glamis, 3 mi nw Glamis, 5 mi n Glamis, 10 mi n Glamis, Bard, Andrade; MEXICO: SONORA: 6 mi n El Golfo; 84 specimens are known. The species has been collected in the months of April through October.

Natural history

Host. Unknown. Members of this family are all parasitoids on other insects, particularly bees and sphecid wasps.

Habitat requirements. Sand dunes, from the Algodones Dunes south to northern Sonora, Mexico.

Collecting techniques. Specimens have been collected in yellow pan, pitfall, malaise and black light traps.

Population status

Unknown.

Sensitivity to disturbance

Unknown.

Information sources



Dasymutilla nocturna, male side view



Dasymutilla nocturna, male, top view.



Dasymutilla nocturna, female, side view.

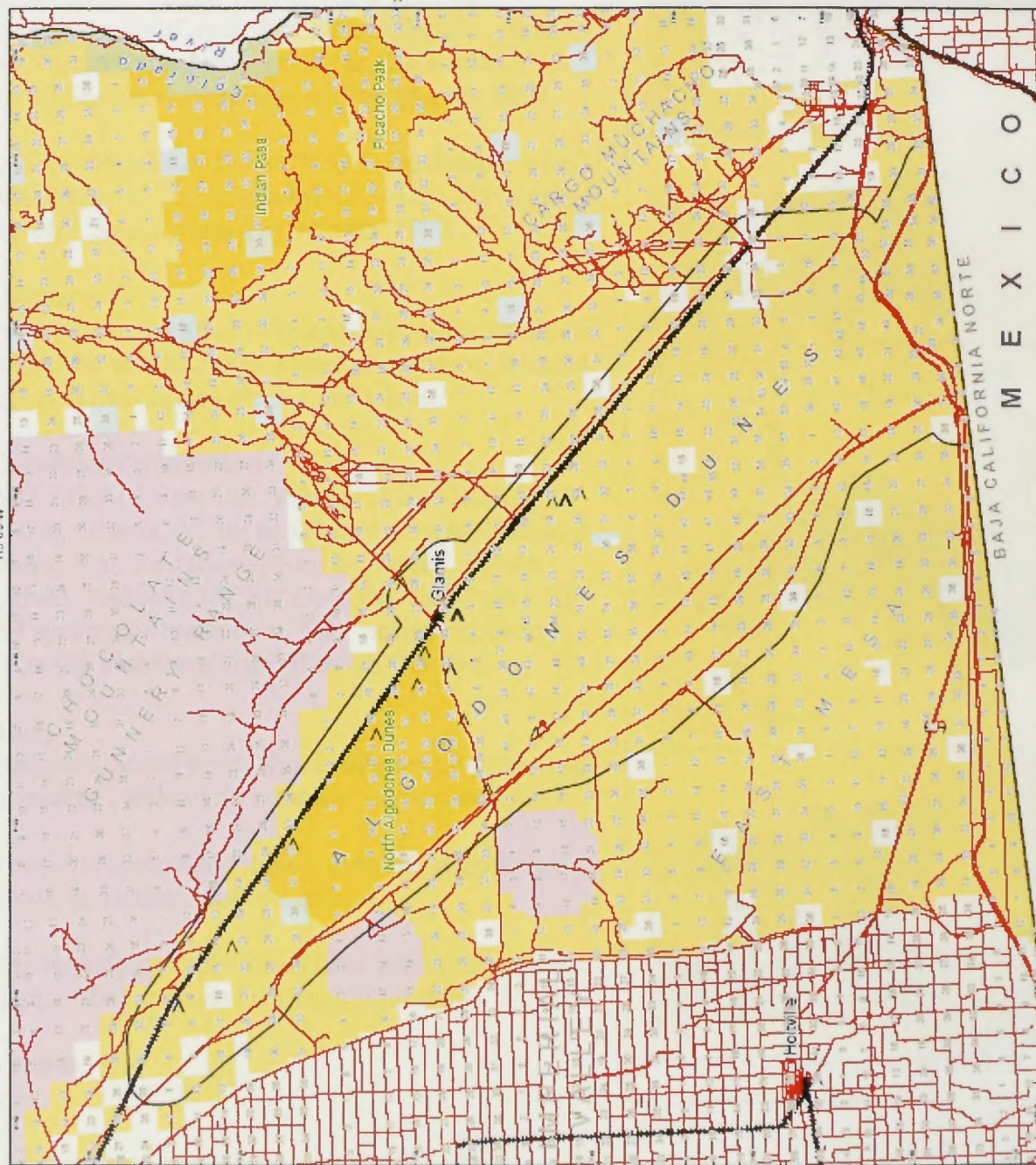


Dasymutilla nocturna, female, top view.

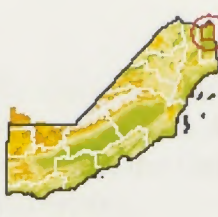
Specimens were examined from museum collections in the Bohart Museum of Entomology, University of California, Davis; State Collection of Arthropods, California Department of Food and Agriculture, Sacramento. Information was also taken from Barr and Hurd (1947), Manley (1998, 2005) and Mickel (1928).

Distribution Map for Nocturnal *Dasymutilla nocturna*

A2007D



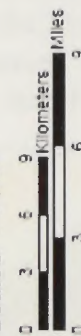
Location



Legend

- > *Dasymutilla nocturna*
- California State Line
- Algodones Dunes Boundary
- Federal Wilderness
 - BLM
- Land Ownership
 - Bureau of Land Management
 - Forest Service
 - National Park Service
 - Bureau of Reclamation
 - US Fish and Wildlife Service
 - Military
 - State Lands
 - County / City / Regional
 - Unclassified

Scales 1:50,000



Map Source

100 Department of the Interior
BUREAU OF LAND MANAGEMENT
SACRAMENTO, CALIFORNIA
95834-8148
Data Provided: 8/3/82
Project: 00, dasymutilla, nocturna, 2000, 2000

Distribution map of *Dasymutilla nocturna*.

Algodones Sand Wasp
***Microbembex elegans* Griswold**
 (Hymenoptera: Sphecidae)

Taxonomy

Microbembex elegans Griswold 1996:142. Holotype male; California: Imperial Co.: Glamis Dunes, 1.6 km w Glamis (the type series is deposited in the USDA Bee Biology & Systematics Laboratory, Logan, Utah).

Diagnostic features

This species differs from others in the genus by the presence of a carinate midcoxae and the distinctively modified male mid and hindlegs. Females have white rake spines on the foreleg and a forecoxal spine. Body length ranges from 9-12 mm.

Collection localities/distribution

CALIFORNIA: Imperial Co.: 1 mi w Glamis, 4 mi south Ogilby; 11 specimens have been described, which were collected in the months of September and October. This is only one of two North American species with localized distributions; the rest are widely distributed.

Natural history

Nectar plants. Unknown.

Habitat requirements. This species is endemic to the Algodones Dunes. It has been collected nowhere else. According to Griswold (1996) *elegans* is restricted to dune areas with active slip faces, around the base of shrubs where detritus accumulates. These wasps are scavengers, feeding their larvae on dead and dying insects they find on the ground. The shallow nests are built in the soil and are provisioned with dead insects.

Collecting techniques. Malaise trap, hand netting.

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that adversely affects their nest and foraging sites in the sand could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of foraging sites affected and the severity of the impact to these foraging sites. Griswold (1996) commented that no specimens were found in a search of areas with high off-road vehicle use and no vegetation.

Information sources



Microbembex elegans, side view.

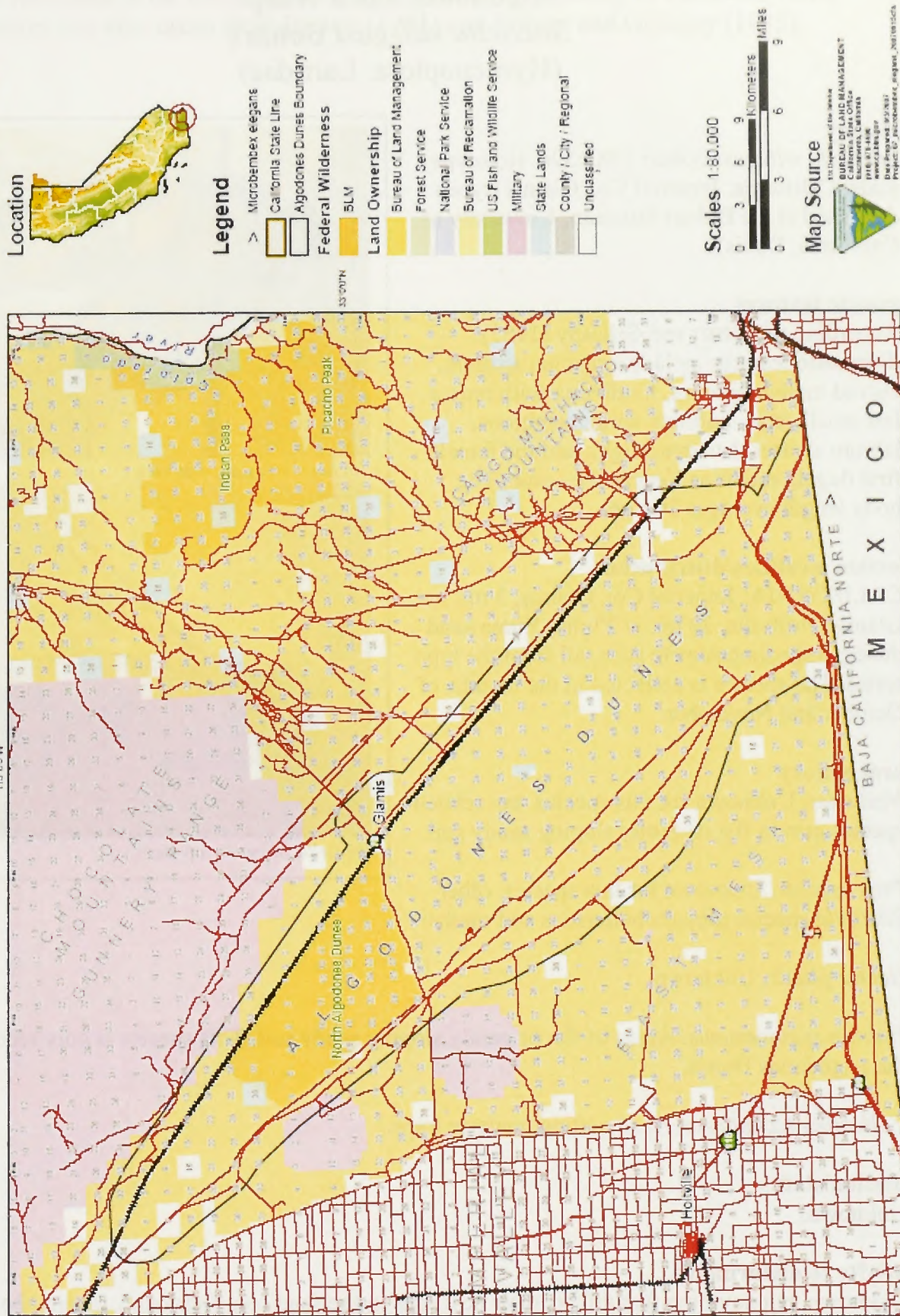


Microbembex elegans, top view.

Information came from Griswold (1996) and collection data from Terry Griswold.

Distribution Map for Algodones Sand Wasp, *Microbembex elegans*

A2007D



Distribution map of *Microbembex elegans*.

Algodones Sand Wasp *Stictiella villegasi* Bohart (Hymenoptera: Larridae)

Taxonomy

Stictiella villegasi Bohart 1982:596. Holotype male; California: Imperial Co., Glamis (types deposited at the Bohart Museum, University of California, Davis).

Diagnostic features

According to Bohart and Gillasp (1985) diagnostic features include a distinct arolium, curved male basitarsus, hindfemur with only a few small setae, untinted wing membrane, labrum shorter than eye height, and the female first flagellomeres as long as the scape. The body length averages 20 mm.

Collection localities/distribution

CALIFORNIA: Imperial Co., Glamis, 3 mi. nw Glamis, Holtville, 20 mi. w Yuma, Yuma sand dunes; 8 specimens were seen, all from the type series. The species is collected in the months of October and November.

Natural history

Nest sites. Unknown for this species, but related species nest in flat or gently sloping sandy soil.

Prey species. Unknown for this species, other *Stictiella* species prey on butterflies and moths.

Nectar plants. Unknown.

Habitat requirements. Areas of flat or gently sloping sandy soil. This species is only recorded from the Algodones Dunes.

Collecting techniques. Hand netting, malaise traps.

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects their nest sites in the sand could seriously impact the species.

How significant any such habitat disturbance would be to this species would depend on the number of foraging sites affected and the severity of the impact to these foraging sites.

Information sources

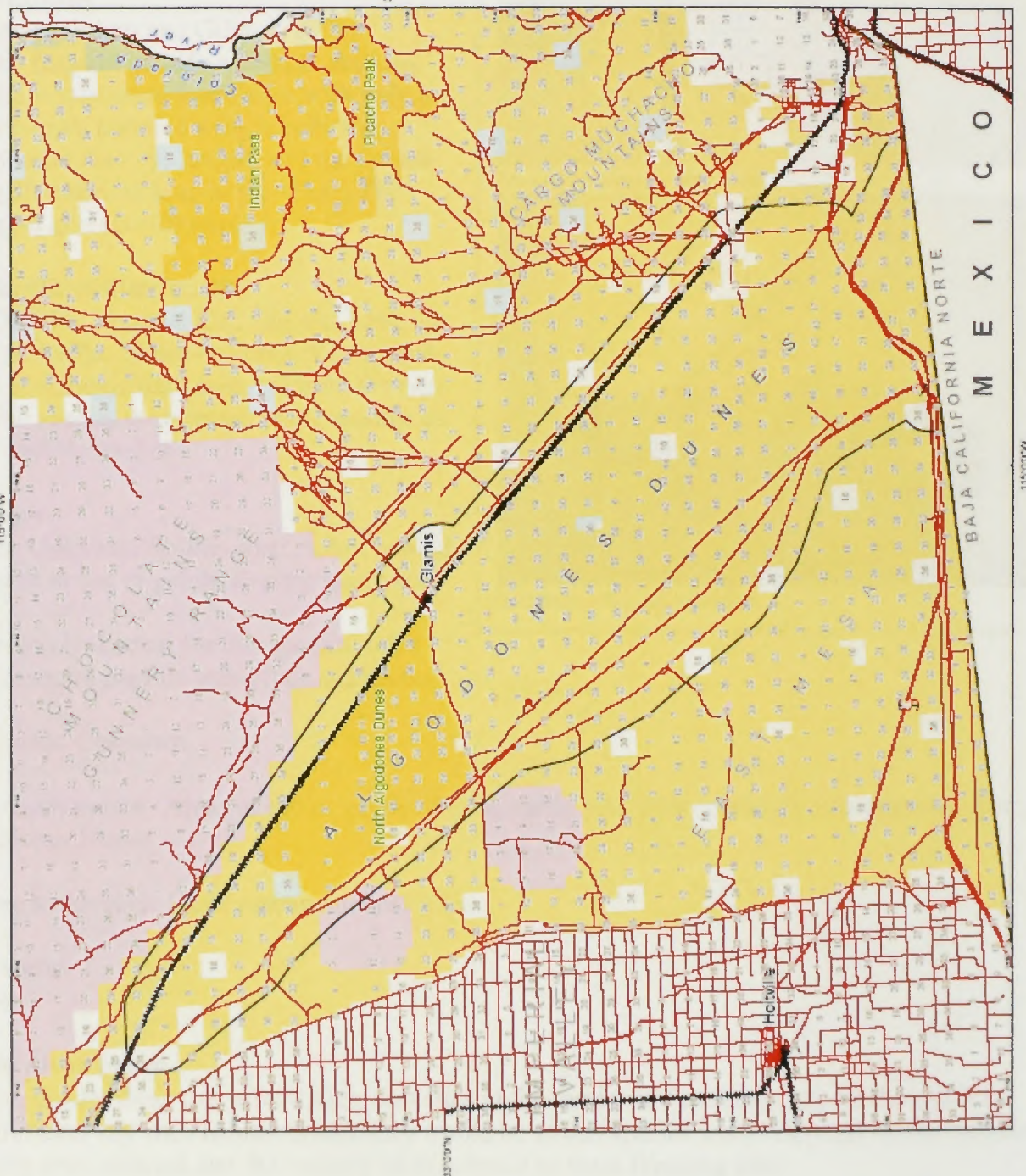


Stictiella villegasi, side view.

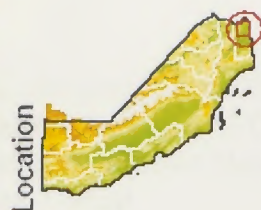


Stictiella villegasi, top view.

Museum specimens in the Bohart Museum of Entomology, University of California, Davis. Information was also taken from Bohart (1982) and Bohart and Gillaspay (1985).



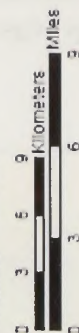
Distribution map of *Stictiella villegasi*.



Legend

- | | |
|---|------------------------------|
| > | Stitella Villegasi |
| | California State Line |
| | Algodones Dunes Boundary |
| | Federal Wilderness |
| | SLM |
| | Land Ownership |
| | Bureau of Land Management |
| | Forest Service |
| | National Park Service |
| | Bureau of Reclamation |
| | US Fish and Wildlife Service |
| | Military |
| | State Lands |
| | County / City / Regional |
| | Unclassified |

Scales 1:80,000



Map Source



BUREAU OF LAND MANAGEMENT
California State Office
Sacramento, California
95833-0001
www.blm.gov

Algodones Euparagia
***Euparagia* new species**
 (Hymenoptera: Vespidae)

Taxonomy

This is one of ten species of the genus *Euparagia*. *Euparagia* is endemic to the southwestern region of North America. The genus belongs to the primitive, monotypic subfamily Euparaginae, in the family Vespidae. The genus was most recently revised by Bohart (1989), but is undergoing revision by James M. Carpenter, American Museum of Natural History, New York.

Diagnostic features

These are small yellow, orange and black marked predatory wasps averaging 5-7 mm long.

Collection localities/distribution

CALIFORNIA: Imperial Co., sand dunes east of Brawley, one specimen: 7 mi w Glamis, four specimens: 2 mi w Glamis, one female: Riverside Co., 4 mi. E. of Indio, one specimen, San Bernardino Co., south side Kelso Dunes; 17 specimens were examined. The species was collected in the months of March, June and July.

Natural history

Nest sites. *Euparagia* nest in burrows in the ground.

Prey species. Other species of *Euparagia* are beetle predators.

Nectar plants. These wasps have been collected on flowers of *Coldenia plicata*, *Eriogonum deserticola* and *Tiquilia* sp.

Habitat requirements. loose sandy soil, dunes. These wasps are found on sand dunes east of Brawley, east of Indio, the Algodones Dunes and the Kelso Dunes.

Collecting techniques. Hand netting, malaise trap.

Population status

Unknown.

Sensitivity to disturbance

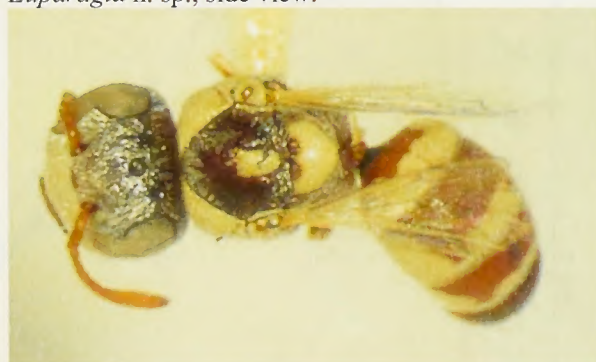
Unknown, but anything that affects their nest sites in the sand could seriously impact the species.

How significant any such habitat disturbance would be to this species would depend on the number of foraging sites affected and the severity of the impact to these foraging sites.

Information sources



Euparagia n. sp., side view.

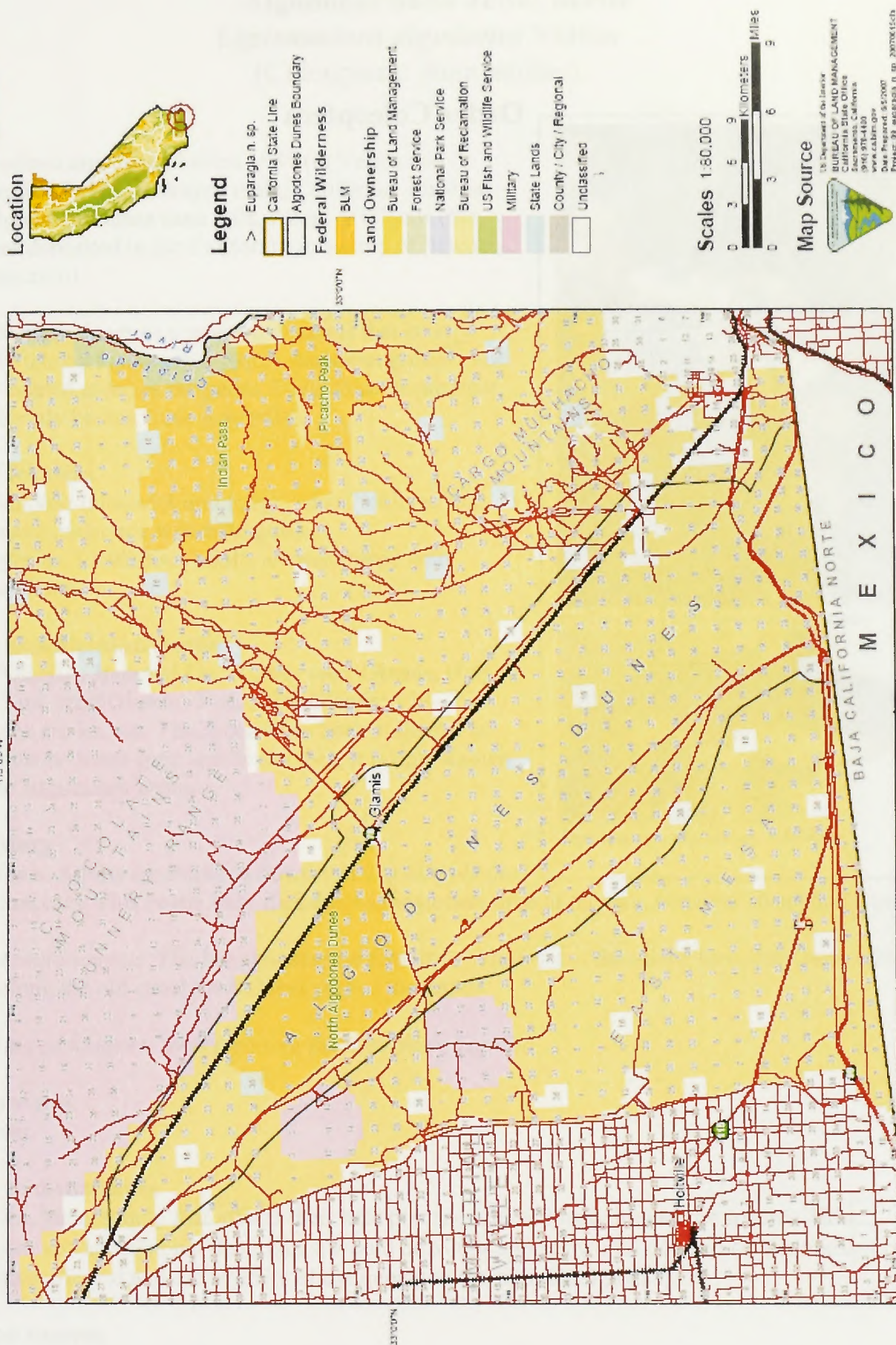


Euparagia n. sp., top view.

Specimens are in the collection of the Entomological Research Museum, University of California, Riverside. Specimen collection data was obtained from J. M. Carpenter.

Distribution Map for Algodones Euparagia, *Euparagia n. sp.*

A2007D



Distribution map of *Euparagia n. sp.*

Specimens in the collection of the Department of Research Museum, University of California
The following specimens are deposited from J. M. Carpenter

Order Coleoptera



Distribution map of *Epiplatys n. sp.*

Algodones Sand Jewel Beetle

Lepismadora algodones Velten

(Coleoptera: Buprestidae)

Taxonomy

Lepismadora algodones Velten 1987 (in Velten and Bellamy 1987):188. Holotype male; California: Imperial Co., Algodones Dunes sand hills, 7.2 mi w Glamis (the types are deposited in the California Academy of Sciences, San Francisco)

This species belongs to a monotypic genus that is only distantly related to any other North American groups. The nearest related group is the genus *Eudiadora* Obenberger, which is only known from Argentina.

Diagnostic features

The small size (around 3 mm long), "sand"-colored and white waxy underside will distinguish this species. In addition, adults are associated with *Tiquilia* plants.

Collection localities/distribution

CALIFORNIA: Imperial Co.: 7.2 mi. west Glamis, Hwy 178, 7.3 mi. west Glamis, 2 mi. north Glamis; 159 specimens are known. The species has been collected in the months between June and September. It is only known from the Algodones Dunes.

Natural history

Host plants. Adults are found in flowers of *Tiquilia plicata* (Boraginaceae). This beetle only flies during the hottest time of the day, between 10 am and 2 pm.

Habitat requirements. The larval host plant remains unknown and the adults have only been collected in and along the old canal on the west side of the dunes.

Collecting techniques. Sweep netting the host plant, *Tiquilia*.

Population status

Unknown.

Sensitivity to disturbance

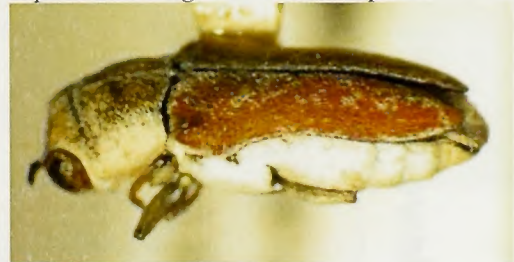
Unknown, but anything that affects their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants.

Information sources

Specimens were examined in museum collections at the University of California, Riverside, and State Insect Collection, California Department of Food & Agriculture, Sacramento. Information was also taken from Velten and Bellamy (1987).



Lepismadora algodones on host plant.

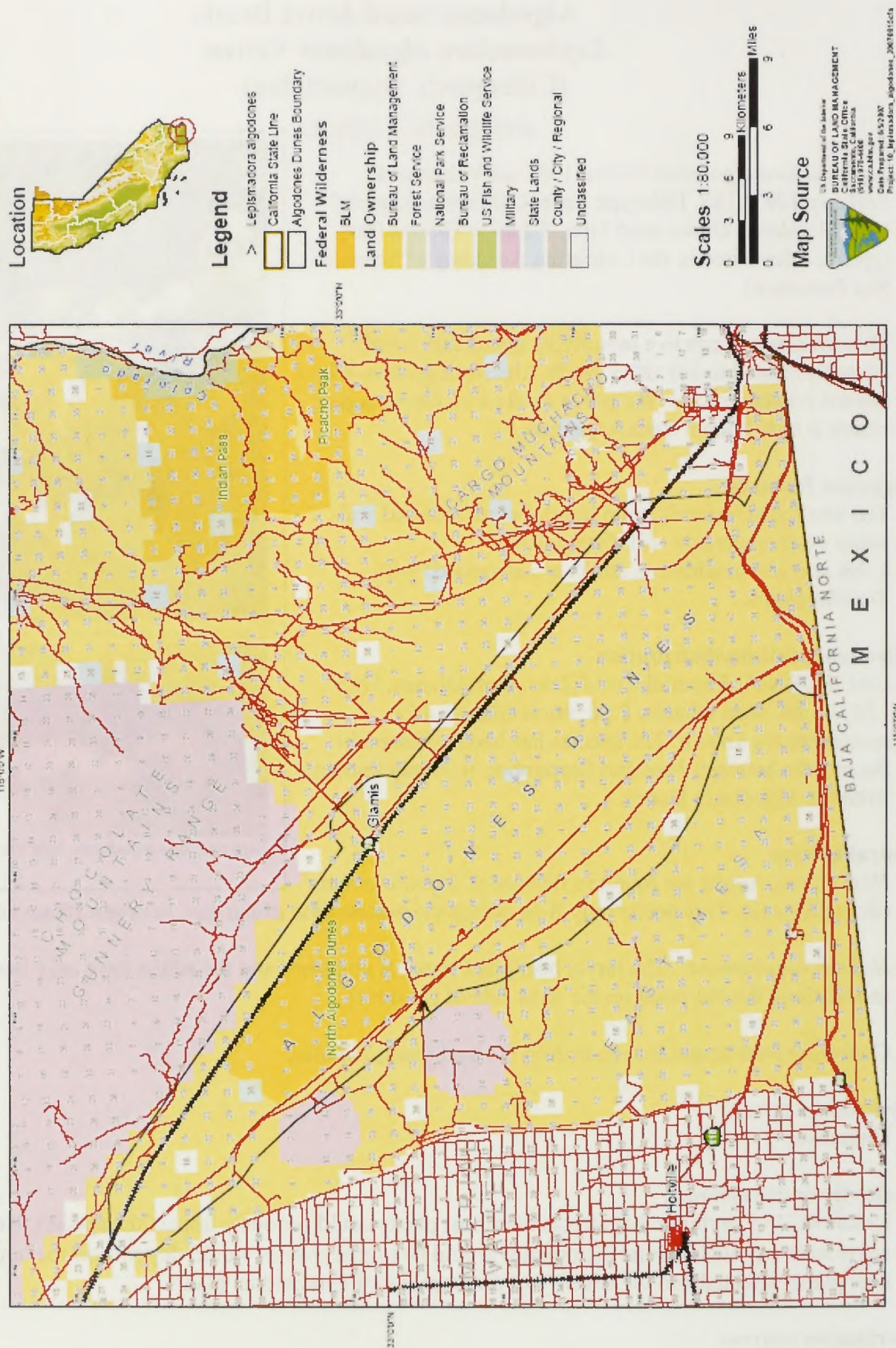


Lepismadora algodones, side view.

Distribution map of *Lepismadora algodones*.

A2017D
BLM

Distribution for Algodones Sand Jewel Beetle, *Lepismadora algodones*



Algodones White Wax Jewel Beetle

Prasinalia imperialis (Barr)

(Coleoptera: Buprestidae)

Taxonomy

Prasinalia imperialis (Barr) 1969:326. (original generic name: *Hippomelas*). Holotype male; California: Imperial Co., 4 mi west Gordon's Well (the type series is deposited in the California Academy of Sciences).

Diagnostic features

This is the largest (19-24 mm long) buprestid found in sand dune habitats in California. The body is iridescent red-purple. However, newly emerged individuals are covered with white waxy powder.

Collection localities/distribution

CALIFORNIA: Imperial Co., Glamis, Glamis: 3.9 mi. west, 5.5-6.5 mi. west, 6.2 mi. west, 7 mi. west, 7.3 mi. west Glamis; 6.2 mi. west, 17 mi. northwest; 4 mi. west Gordon's Well; Brawley east sand dunes (=Algodones Dunes); 62 specimens were seen. This species has been collected in the months of June and July.

Natural history

Host plants. The species is associated with *Eriogonum deserticola* (Polygonaceae), and adults are found resting on the foliage, particularly in the early morning. Larvae have been found in the roots and crown of this plant species.

Habitat requirements. Sand dunes where the *Eriogonum* host plant is present. The species occurs in the Algodones Dunes.

Collecting techniques. Net-collecting.

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants.

Information sources

Museum specimens in the State Arthropod Collection, California Department of Food and Agriculture, Sacramento; Entomological Research Museum, University of California, Riverside, and



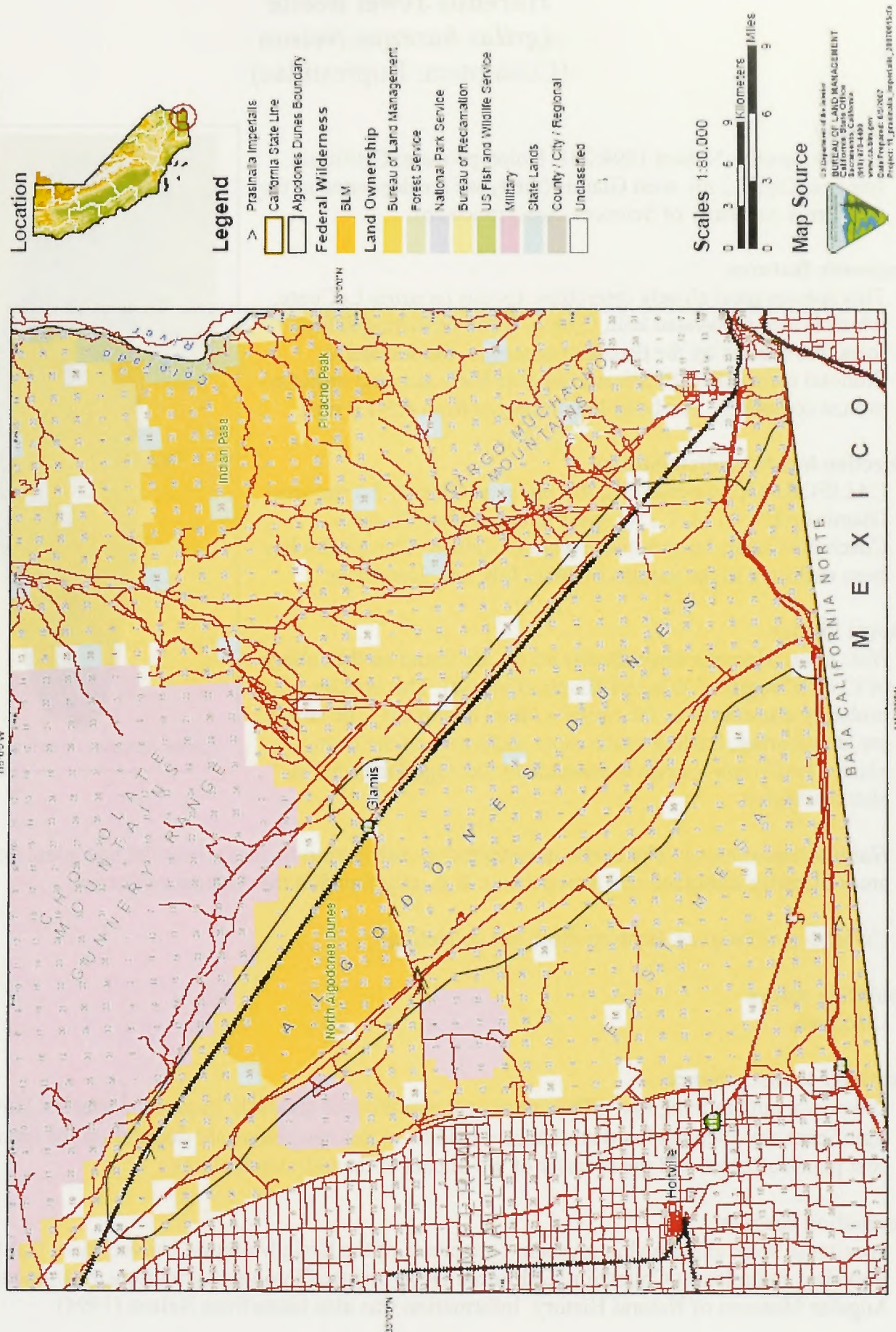
Prasinalia imperialis perching.



Prasinalia imperialis, side view.

Essig Museum, University of California, Berkeley. Information was also taken from Barr (1969) and Nelson and Bellamy (1996).

Distribution for Algodones White Wax Jewel Beetle, *Prasinolia imperialis* A2007D



Distribution map of *Prasinolia imperialis*.

Harenus Jewel Beetle
***Agrilus harenus* Nelson**
 (Coleoptera: Buprestidae)

Taxonomy

Agrilus harenus Nelson 1994:261. Holotype male; California: Imperial Co., 7.2 mi. west Glamis (the types are deposited in the California Academy of Sciences, San Francisco).

Diagnostic features

This species most closely resembles *Agrilus lacustris* LeConte, which is also associated with *Croton*. It can be distinguished from that species by the denser pubescence, the sublateral Pronotal carina strongly sinuate, smaller body size and uniform bronze coloration. The body length ranges from 4.5-7.0 mm.

Collection localities/distribution

CALIFORNIA: Imperial Co., 4/7 mi. west Glamis, 7.2 mi. west Glamis on Hwy 178, 7.3 mi. west junction Hwy 78 and Coachella Canal; 16 specimens were examined. The species has been collected in the months of June, July and September.

Natural history

Host plant. Harenus Jewel Beetle adults are found on the foliage of *Croton wigginsii* Wheeler (Euphorbiaceae). This species probably also serves as the beetle's larval host plant. The larvae are stem boring, feeding in the roots and crown of the host plant. The *Croton* species is endemic to the Algodones and is also threatened.

Habitat requirements. The beetle is restricted in distribution to sites where the host plant occurs in areas of partly stabilized and active dunes. It is only found in the Algodones Dunes.

Collecting techniques. Beating sheet, net collecting.

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants.

Information sources

Specimens were examined in museum collections of the Essig Museum, University of California, Berkeley; State Insect Collection, California Department of Food & Agriculture, Sacramento and Los Angeles Museum of Natural History. Information was also taken from Nelson (1994).



Agrilus harenus, side view.

Algodones Dune Weevil
Trigonoscuta rothi algodones Pierce
(Coleoptera: Curculionidae)

Taxonomy

Trigonoscuta rothi algodones Pierce 1975:74. Holotype male; California: Imperial Co., Algodones Dunes (types deposited in Natural History Museum of Los Angeles).

Diagnostic features

This is a small globular weevil, which is covered with opalescent whitish scales. Adults lack wings. The body length averages 7-9 mm.

Collection localities/distribution

CALIFORNIA: Imperial Co.: Algodones Dunes; no specimens were seen. The type series was collected in April.

Natural history

Host plants. Unknown, but other members of the genus are root feeders.

Habitat requirements. Sand dunes and open sandy soil. The subspecies is only known from the Algodones Dunes.

Collecting techniques. Pitfall trap, hand picking.

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants. These flightless weevils are unable to disperse effectively.

Information sources

Information was also taken from Pierce (1975).

Imperial Dune Weevil
Trigonoscuta rothi imperialis
 (Coleoptera: Curculionidae)

Taxonomy

Trigonoscuta rothi imperialis Pierce 1975:74. Holotype female; California: Imperial Co., Algodones Dunes (types deposited in Natural History Museum of Los Angeles).

Diagnostic features

Unknown.

Collection localities/distribution

CALIFORNIA: Imperial Co.: Algodones Dunes; no specimens were seen.

Natural history

Host plants. Unknown, but other members of the genus are root feeders.

Habitat requirements. Unknown. The subspecies is only known from the Algodones Dunes.

Collecting techniques. Pitfall trap, hand picking.

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants. These flightless weevils are unable to disperse effectively.

Information sources

Information was also taken from Pierce (1975).

Punctate Dune Weevil
***Trigonoscuta rothi punctata* Pierce**
(Coleoptera: Curculionidae)

Taxonomy

Trigonoscuta rothi imperialis Pierce 1975:74. Holotype female; California: Imperial Co., Algodones Dunes (types deposited in Natural History Museum of Los Angeles).

Diagnostic features

Unknown.

Collection localities/distribution

CALIFORNIA: Imperial Co.: Algodones Dunes; no specimens were seen.

Natural history

Host plants. Unknown, but other members of the genus are root feeders.

Habitat requirements. Unknown. The subspecies is only known from the Algodones Dunes.

Collecting techniques. Pitfall trap, hand picking.

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants. These flightless weevils are unable to disperse effectively.

Information sources

Information was taken from Pierce (1975).

Roth's Dune Weevil
***Trigonoscuta rothi rothi* Pierce**
 (Coleoptera: Curculionidae)

Taxonomy

Trigonoscuta rothi rothi Pierce 1975:73. Holotype male; California: Imperial Co., 13 mi w Winterhaven, Algodones Dunes (the types are deposited in the Natural History Museum of Los Angeles).

Pierce (1975) described four subspecies of *Trigonoscuta rothi* – *rothi*, *algodones*, *punctata* and *imperialis*, from the same locality in the Algodones Dunes. There is no specimen information available for any of these except the type descriptions and for the nominate subspecies, *rothi*. The genus is currently under revision by Charles W. O'Brien. According to O'Brien, one or more of these subspecies may be valid species, but it is currently impossible to tell which at this time.

Diagnostic features

Trigonoscuta rothi rothi is a small globular weevil, which is covered with opalescent whitish scales. Adults are flightless, completely lacking hindwings. The body length averages 6.5-8.5 mm.

Collection localities/distribution

CALIFORNIA: Imperial Co.: Glamis, 2 mi north Glamis, 2 mi. west Glamis and 5 mi. west Glamis; Gray's Well Rd.; Ogilby Rd. US Rte 8; Brock Research Center, 26.4 mi. east Calexico; 13 mi. west Winterhaven; 210 specimens were seen. The species has been collected in the months of mid January to late March.

Natural history

Host plants. Adults are foliage feeders and larvae feed on roots and buried stems. According to unpublished observations by E. R. Tinkham adults are found feeding at night on the foliage of *Eriogonum deserticola*, *Palafoxia linearis* (now *Palafoxia arida*), *Hilaria rigida* (now *Pleuraphis rigida*), *Coldenia plicata* (now *Tiquilia plicata*), *Oenothera deltoids* and *Croton californicus*. Adults are active on the surface of the sand at night and remain buried in the sand during the day.

Habitat requirements. Sand dunes and open sandy soil. The subspecies is only known from the Algodones Dunes.

Collecting techniques. Pitfall trap, hand picking, sand sifting.

Population status

Unknown.

Sensitivity to disturbance



Trigonoscuta rothi rothi, side view.



Trigonoscuta rothi rothi, top view.

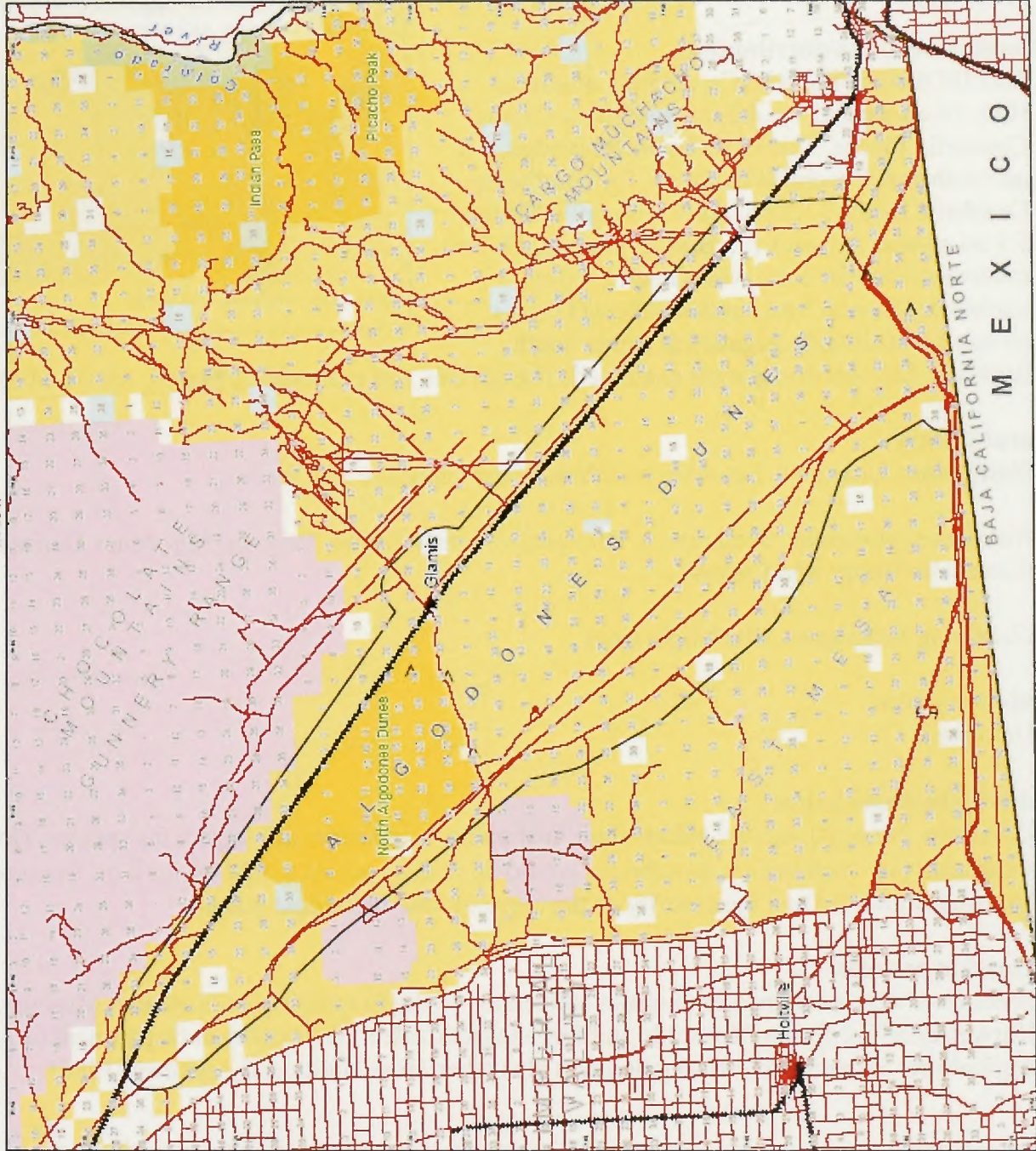
Unknown, but anything that affects their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants. These flightless weevils are unable to disperse effectively.

Information sources

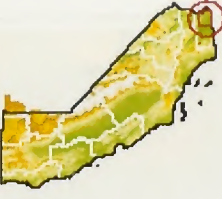
Specimens were examined in museum collections of the Bohart Museum of Entomology, University of California, Davis; Entomological Research Museum, University of California, Riverside, and State Arthropod Collection, California Department of Food and Agriculture, Sacramento. Information was also taken from Pierce (1975).

Distribution Map for Algodones Dune Weevil, *Trigonoscuta rothi*

A2007D



Location



Legend

- > *Trigonoscuta rothi*
- California State Line
- Algodones Dunes Boundary
- Federal Wilderness
- SLM
- Land Ownership
- Bureau of Land Management
- Forest Service
- National Park Service
- Bureau of Reclamation
- US Fish and Wildlife Service
- Military
- State Lands
- County / City / Regional
- Unclassified

Scales 1:80,000



Map Source



Project: 12, trigonoscuta_rothi_20070414

Distribution map of *Trigonoscuta rothi rothi*.

Carlson's Dune Beetle
***Anomala carlsoni* Hardy**
 (Coleoptera: Scarabaeidae: Rutellinae)

Taxonomy

Anomala carlsoni Hardy 1976:365. Holotype male;
 California: Imperial Co., Glamis.

Diagnostic features

This is a small, pale brown species of scarab,
 ranging from 6-8 mm long.

Collection localities/distribution

CALIFORNIA: Imperial Co.: 5.5 mi. southeast Hwy 78 on Sand Hwy, 4.2 mi. southwest Cactus, Coachella Bridge, 1 mi east Coachella Bridge, 1.5 mi southwest Coachella Bridge, 2.5 mi northeast Coachella Bridge, 3.5 mi. north Coachella Bridge, 5.1 mi southeast Coachella Bridge, Glamis, 13.7 mi. northwest Glamis, 2 mi. west Glamis, 3.5 mi northwest Glamis, 5 mi south southeast Glamis, 7 mi southeast Glamis, Algodones Dunes south Ruthven; 126 specimens were examined. The species was collected in March, April and May.



Anomala carlsoni, side view.



Anomala carlsoni, top view.

Natural history

Host plants. Unknown, but other members of the genus are root feeders.

Habitat requirements. Sand dunes. The species is only known from the Algodones Dunes and vicinity (Coachella Bridge and Cactus).

Collecting techniques. Black light traps.

Population status

Unknown.

Sensitivity to disturbance

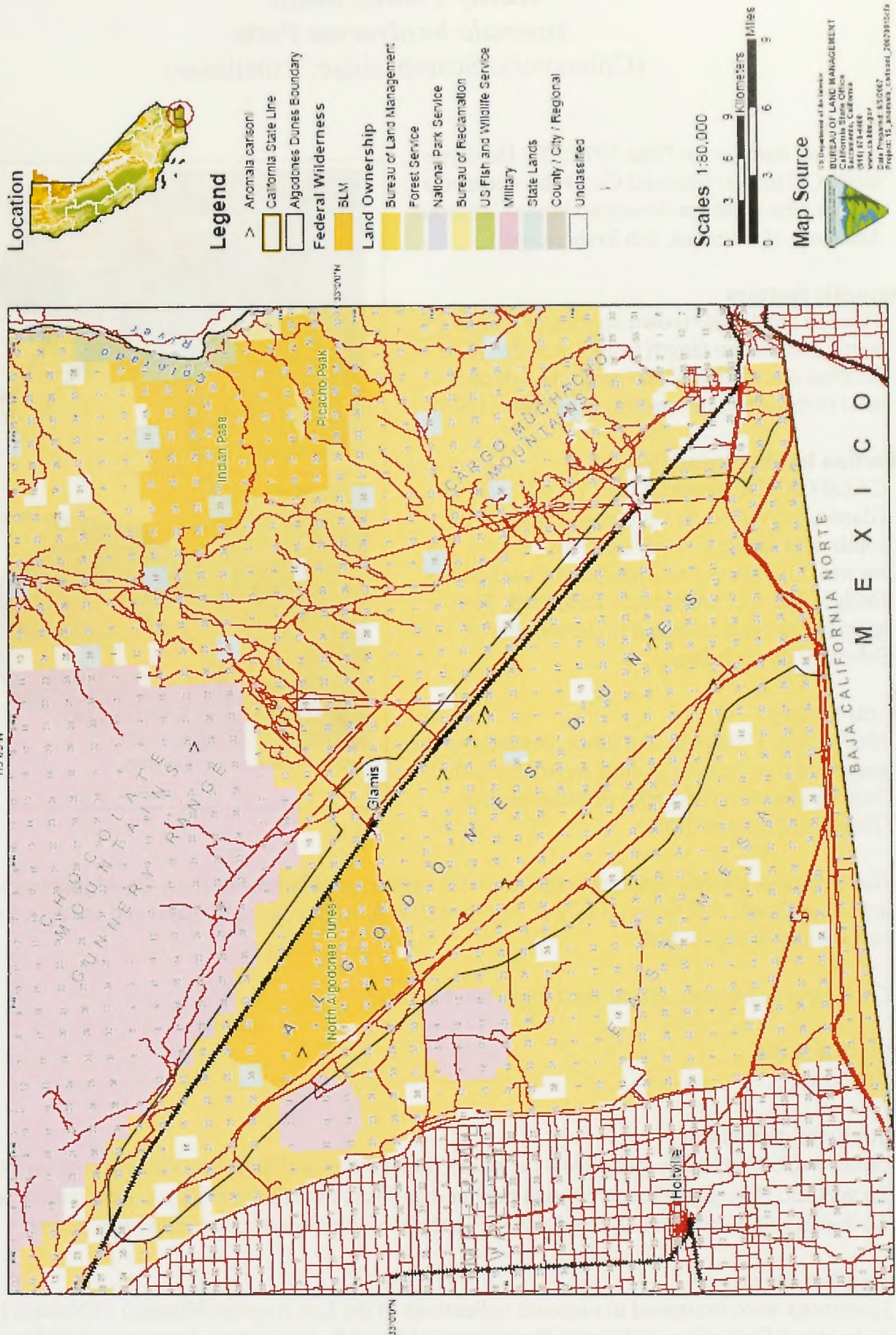
Unknown, but anything that affects their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants.

Information sources

Specimens were examined in museum collections of the Entomological Research Museum, University of California, Riverside and State Insect Collection, California Department of Food & Agriculture, Sacramento. Information was also taken from Hardy and Andrews (1986).

Distribution Map for Carlson's Dune Beetle, *Anomala carlsoni*

A2007D



Distribution map of *Anomala carlsoni*.

Hardy's Dune Beetle

Anomala hardyorum Potts

(Coleoptera: Scarabaeidae: Rutellinae)

Taxonomy

Anomala hardyorum Potts 1976:221. Holotype male; California: Imperial Co., 3 mi. northwest Glamis (the types are deposited in the California Academy of Sciences, San Francisco).

Diagnostic features

This is a small pale brown species of scarab beetle, ranging in length from 7-10 mm. A detailed description of the genitalia, which is used to discriminate species, is in Potts (1976).

Collection localities/distribution

CALIFORNIA: Imperial Co.: 1.3 mi. west Glamis, 5.5 mi. south southeast Glamis, 7 mi. southeast Glamis, 7.4 mi southeast Glamis, 9.5 mi west Glamis, 5.1 mi. southeast Coachella Bridge; 271 specimens were examined. The species has been collected in the months of February through June.

Natural history

Host plants. Unknown, but other members of the genus are root feeders. Adults have been sifted from sand under a diversity of plant species (Hardy & Andrews 1980).

Habitat requirements. Uncompacted sand; the species is only known from the Algodones Dunes on active north and east faces (Hardy & Andrews 1980). Adults leave the sand and are active on the sand surface and flying at dusk.

Collecting techniques. Black light traps, sand sifting.

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects the dunes they inhabit and their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants.

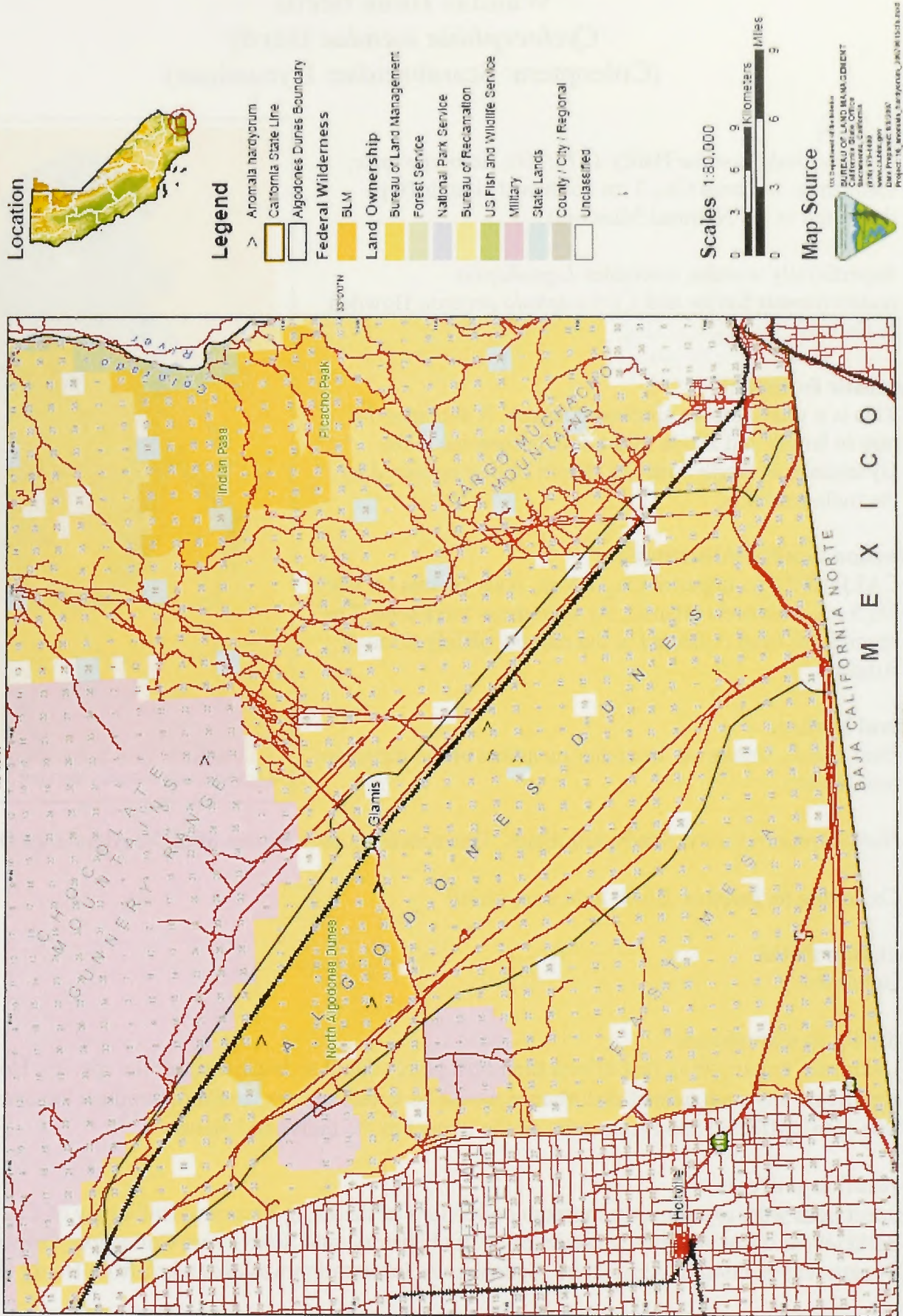
Information sources

Specimens were examined in museum collections of the Los Angeles Museum of Natural History and State Insect Collection, California Department of Food & Agriculture, Sacramento. Information was also taken from Hardy and Andrews (1980) and Potts (1976).



Distribution Map for Hardy's Dune Beetle, *Anomala hardyorum*

A2017



Distribution map of *Anomala hardyorum*.

Wandae Dune Beetle
***Cyclocephala wandae* Hardy**
 (Coleoptera: Scarabaeidae: Dynastinae)

Taxonomy:

Cyclocephala wandae Hardy 1974:160. Holotype male; California: Imperial Co., 3 mi northwest Glamis (type deposited in US National Museum).

Superficially *wandae* resembles *Leptohoplia testaceipennis* Saylor and *Cyclocephala arenosa* Howden & Endrödi.

Diagnostic features:

This is a small, brown species of scarab. It averages 7-8 mm in length and is one of the smaller species in the Dynastinae in North America. It can be distinguished by the male genitalia.

Collection localities/distribution:

CALIFORNIA: Imperial Co., 1.3 mi. west Glamis on Hwy 78, 5 mi. southwest Glamis; six specimens were seen. The species has been collected in the months of July through August.

Natural history:

Host plants. Unknown, but other members of the genus are root feeders.

Habitat requirements. Sandy soil/dunes. This species is only known from the Algodones Dunes.

Collecting techniques. Black light trap, pitfall

Population status:

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants.

Information sources:

Specimens were examined in museum collections of the Essig Museum, University of California, Berkeley, and Los Angeles Museum of Natural History, and State Insect Collection, California Department of Food & Agriculture, Sacramento. Information was also taken from Hardy (1974).



Cyclocephala wandae, top view.

Andrew's Dune Scarab Beetle
***Pseudocotalpa andrewsi* Hardy**
 (Coleoptera: Scarabaeidae: Rutellinae)

Taxonomy

Pseudocotalpa andrewsi Hardy 1971:239. Holotype male; California: Imperial Co., Glamis (types deposited in the California Academy of Sciences, San Francisco).

Diagnostic features

Body length 13-18 mm. This is a distinctive beetle with a pale yellowish brown body and dense white hair on the venter.

Collection localities/distribution

CALIFORNIA: Imperial Co.: Algodones dunes south Ruthven, Glamis, 0.6 mi. west Glamis, 1.3 road mi. west Glamis on Hwy 78, 1.5 mi. west Glamis, 11 mi south southeast Glamis, 13.7 mi. northwest Glamis, 2 mi. west Glamis, 3 mi. northwest Glamis, 2.7 mi. northwest Glamis, 5 km north Glamis, 7 mi. southeast Glamis, Algodones Dunes south Ruthven, 9.5 mi. northwest Glamis, 5 mi. south Ogilby; San Diego Co.: 5 mi. east of Borrego Springs; ARIZONA: Yuma Co., Yuma Dunes. The species is found in the months of February to May.



Pseudocotalpa andrewsi, side view.



Pseudocotalpa andrewsi, top view.

Natural history

Host plants. Unknown, but other members of the genus are root feeders.

Habitat requirements. Sand dunes. According to Hardy (1971) these beetles live deep in sand, only emerging at late twilight to fly to find mates. They are much less frequently collected at black light than by hand collecting during this period.

Collecting techniques. Hand collecting at twilight, black light trapping in early evening.

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects their host plants could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host plants affected and the severity of the impact to the individual plants.

Information sources

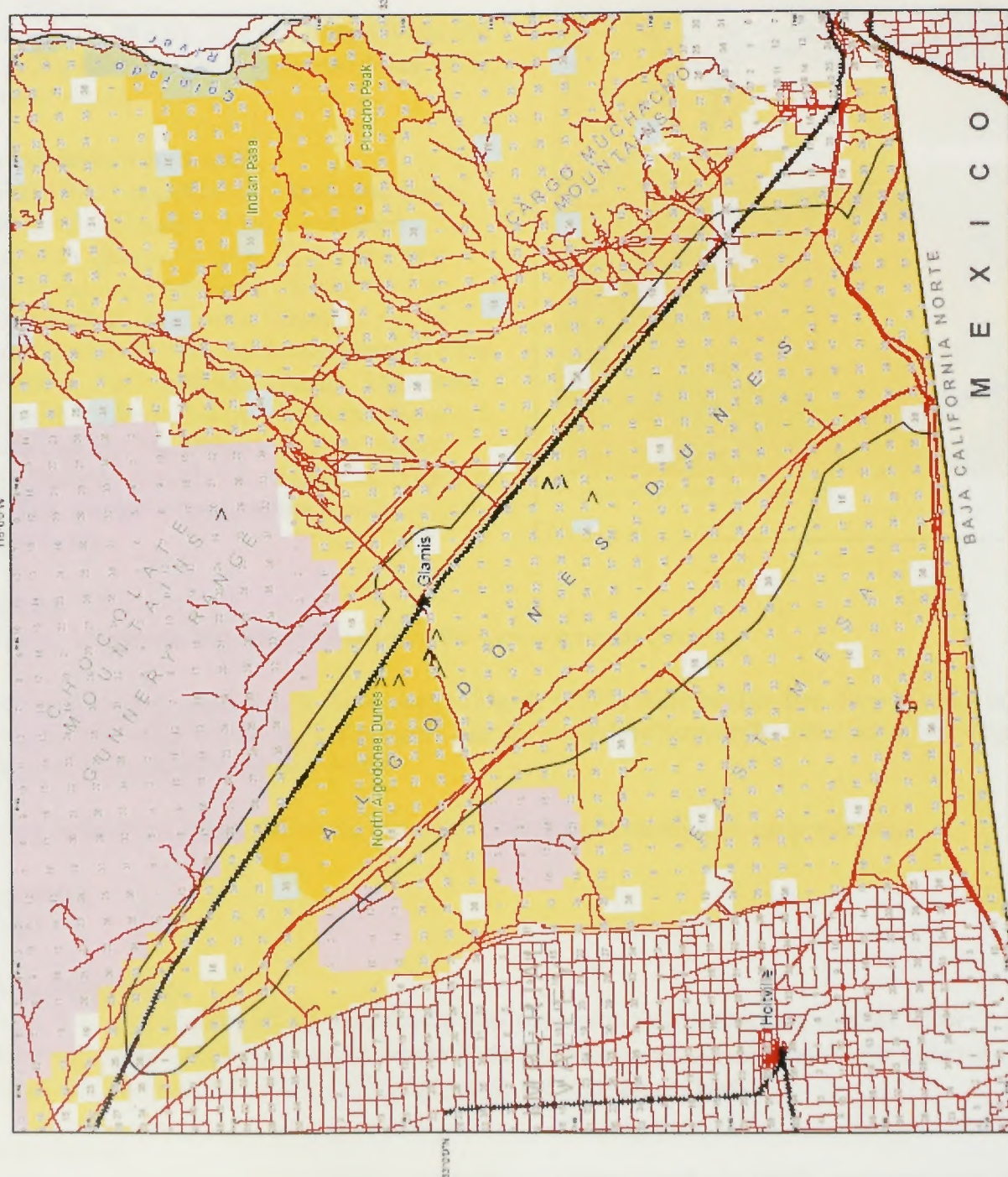
Information is from Hardy (1971), Hardy and Andrews (1986) and Rust (1985), and specimens from the Bohart Museum of Entomology, UC Davis; State Collection of Arthropods, California Dept. of Food & Agriculture; Essig Museum, University of California, Berkeley; Natural History Museum of

Los Angeles; State Arthropod Collection, California Department of Food and Agriculture, and Entomological Research Museum, University of California, Riverside.

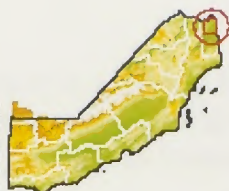


A2007D B.M.

Distribution for Andrew's Dune Scarab Beetle, *Pseudocotalpa andrewsi*



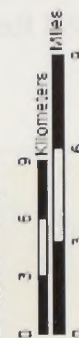
Location



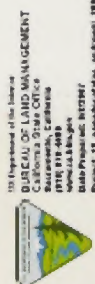
Legend

- > *Pseudocotalpa andrewsi*
- California State Line
- Algodones Dunes Boundary
- Federal Wilderness
- BLM
- Land Ownership
- Bureau of Land Management
- Forest Service
- National Park Service
- Bureau of Reclamation
- US Fish and Wildlife Service
- Military
- State Lands
- County / City / Regional
- Unclassified

Scales 1:80,000



Map Source



Project 15_Pseudocotalpa_andrewsi_1981-1991.dwg

Distribution map of *Pseudocotalpa andrewsi*.

Section 2. Additional Species Endemic to the Dunes

Glamis Sandfly
***Apiocera warneri* Cazier**
(Diptera: Apioceridae)

Taxonomy

Apiocera warneri Cazier 1985:17. Holotype male; California: Imperial Co., 1.5 mi w Glamis (types deposited in the American Museum of Natural History).

Diagnostic features

The pale, almost unmarked body coloration is diagnostic for this species, separating it from the closely related species, *A. sonorae* Cazier and *A. bilineata* Painter.

Collection localities/distribution

CALIFORNIA: Imperial Co.: 1.5 mi w Glamis, 4 mi n Glamis; 5 specimens have been described. The species was collected in September.

Natural history

Nectar sources. Unknown.

Habitat requirements. Larval stages are predatory, living in sand dunes/loose sandy soil. The species is only known from the Algodones Dunes.

Collecting techniques. Hand netting and black light trap.

Population status

Unknown.

Sensitivity to disturbance

Unknown.

Information sources

No specimens were seen. Information was taken from the original publication, Cazier (1985).

Glamis Robberfly
***Efferia macroxipha* Forbes**
 (Diptera: Asilidae)

Taxonomy

Efferia macroxipha Forbes 1988:556. Holotype male; California: Imperial Co., Rt. 78 2 mi west Glamis (deposited in the California Academy of Sciences).

Diagnostic features

This is a large robberfly, almost entirely covered with whitish pilosity. Body length ranges from 19-26 mm. This species also has the longest ovipositor of any nearctic asilid.

Collection localities/distribution

CALIFORNIA: Imperial Co.: 2 mi west Glamis, Glamis off Hwy 78, Gecko Campground near Rt. 78, 3 mi south Route 78; 21 specimens were seen. The species was collected in the month of September.

Natural history

Prey species. Sphecid wasps, noctuid moths and ant lions have been recorded as prey. This predatory fly undoubtedly feeds on a diversity of flying insects that are smaller than it is.

Habitat requirements. Sand dunes. The species was found perching on *Ephedra* and *Eriogonum* twigs just above the soil surface and not directly on the sand, and was collected between 1200 and 1800 hours.

Collecting techniques. Net collecting and malaise trapping.

Population status

Unknown.

Sensitivity to disturbance

Unknown.

Information sources

Specimens were examined in the collections of the California Academy of Sciences, San Francisco. Additional information is from Forbes (1988).

Perdita
Perdita flavicincta
 (Hymenoptera: Andrenidae)

Taxonomy

This species is undescribed, but has been assigned the name *flavicincta* in on-line lists. The species name *flavicincta* has never been published and is therefore a *nomen nudum*, and should not be used.

Diagnostic features

Unknown.

Collection localities/distribution

Reported to be from the Algodones Dunes.

Natural history

Nest sites. Unknown. However, all *Perdita* species nest in the ground.

Nectar plants. Unknown, but *Perdita* species are host plant specific.

Habitat requirements. Unknown

Collecting techniques. Net collecting, yellow bowls and malaise trapping.

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects their nectar and pollen plants or nest sites could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of nectar and pollen plants affected and the severity of the impact to the individual plants.

Information sources

This species name has been listed in a number of websites about the Algodones Dunes, including Wikipedia.org and Answers.com.

Perdita
***Perdita frontalis* Timberlake**
 (Hymenoptera: Andrenidae)

Taxonomy

Perdita frontalis Timberlake 1968:12. Holotype female; California: Imperial Co., 5.7 mi west Glamis (types deposited in the California Academy of Sciences, San Francisco, on permanent loan from the University of California, Riverside).

Diagnostic features

The species most closely resembles *Perdita (Heteroperdita) arenaria* but can be distinguished by the large yellow spot on the side of the frons and the inner eye margin is yellow up to the top of the eye. The body length is 3-4 mm.

Collection localities/distribution

CALIFORNIA: Imperial Co., dunes west Glamis, 5.7 mi. west Glamis; 3 females are recorded. The species was collected in July.

Natural history

Nest sites. Unknown. However, all *Perdita* species nest in the ground.

Nectar plants. *Eriogonum deserticola* and *Coldenia plicata*. *Perdita* species are host plant specific.

Habitat requirements. The species is only known from the Algodones Dunes from the type series.

Collecting techniques. Hand net, malaise trap.

Population status

Unknown.

Sensitivity to disturbance

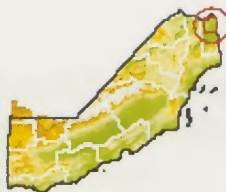
Unknown, but anything that affects their nectar and pollen plants or nest sites could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of nectar and pollen plants affected and the severity of the impact to the individual plants.

Information sources

No specimens have been seen; information is from Timberlake (1968).

The map shows the Glamis area in Southern California, with the Colorado River and Colorado Desert. Key features include the Colorado Mountains, Colorado Desert, and the Glamis area. The map includes a grid of latitude and longitude lines, a scale bar, and a north arrow. The Glamis area is highlighted in yellow, and the Colorado River is shown in blue. The map is titled 'GLAMIS' and 'COLORADO'.

Location



Legend

- | | | |
|---|------------------------------|--|
| > | perdis frontalis | |
| | California State Line | |
| | Algodones Dunes Boundary | |
| | Federal Wilderness | |
| | SLM | |
| | Land Ownership | |
| | Bureau of Land Management | |
| | Forest Service | |
| | National Park Service | |
| | Bureau of Reclamation | |
| | US Fish and Wildlife Service | |
| | Military | |
| | State Lands | |
| | County / City / Regional | |
| | Unclassified | |

Scales 1:50,000



Map Source



THIS IS A PRELIMINARY REPORT OF THE BUREAU OF LAND MANAGEMENT
BUREAU OF LAND MANAGEMENT
California State Office
Sacramento, California
916/373-4469
www.blm.gov

Glamis Night Mutillid
***Sphaerophthalma ecarinata* Schuster**
 (Hymenoptera: Mutillidae)

Taxonomy

Sphaerophthalma ecarinata Schuster 1958:20.
 Holotype male; California (type deposited in the US National Museum).

Diagnostic features

These are moderate-sized nocturnal wasps, ranging from 15-20 mm long. Schuster comments on the unusually large ocelli and eyes and the mandible with a small subapical tooth. Males are winged, females are wingless.

Collection localities/distribution

CALIFORNIA, Imperial Co. 5 mi southwest Glamis; 5 mi southwest Glamis; 6 mi southwest Glamis; 20 mi. east Brawley sand dunes; 3 mi. north Glamis; 78 specimens were examined. The species has been collected in April, July and September. These wasps have only been collected from the Algodones Dunes.



Sphaerophthalma ecarinata, male side view.

Natural history

Biology. Unknown. These are undoubtedly parasitoids on other insects, particularly bees and wasps.

Habitat requirements. Open sandy soil/dunes.

Collecting techniques. Black light trap (male), pitfall trap (female).

Population status

Unknown.

Sensitivity to disturbance

Unknown, but anything that affects their host insects could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host insects affected and the severity of the impact to the individual host insects.

Information sources

Museum specimens in the collections of Utah State University, Logan and State Insect Collection, California Department of Food & Agriculture, Sacramento. Information was also taken from Schuster (1958).

Glamis Night Tiphid

Sedomaya glamisensis Kimsey & Wasbauer

(Hymenoptera: Tiphidae)

Taxonomy

Sedomaya glamisensis Kimsey & Wasbauer 1998:72. Holotype male; California, Imperial Co., Glamis (type series in the University of California, Davis).

Sedomaya belongs to the tiphid subfamily Brachycistidinae. This is monotypic genus is known only from the Algodones Dunes.

Diagnostic features

The genus and species are characterized by the small size, 5-7 mm long, the presence of a stridulatory structure on the forecoxa, the first metasomal sternum with a short, longitudinal carina extending posteromedially from the base, a ventral clypeal bevel, elongate digitus, and reduced wing venation with only two small submarginal and one discoidal cell in the forewing.



Sedomaya glamisensis male, side view.

Collection localities/distribution

CALIFORNIA: Imperial Co., Glamis, 3 mi. north Glamis; 29 specimens were studied. The species has been collected in the months of April and September.

Natural history

Host species. Unknown. Tiphids are all parasitoids but the hosts are unknown for the entire subfamily.

Nectar plants. None.

Habitat requirements. Open sandy soil/dunes; endemic to the Algodones Dunes.

Collecting techniques. Members of this subfamily are mostly collected at UV (blacklight) lights at night. Females are unknown for the genus, but females in related genera have been collected in pitfall traps.

Population status

Unknown.

Sensitivity to disturbance

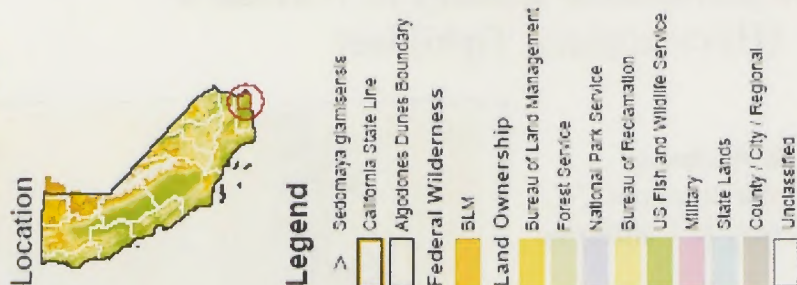
Unknown, but anything that affects their host insects could seriously impact the species. How significant any such habitat disturbance would be to this species would depend on the number of host insects affected and the severity of the impact to the individual host insects.

Information sources

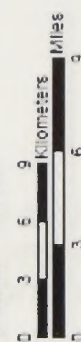
Museum specimens in the Bohart Museum of Entomology, University of California, Davis, and information from Kimsey and Wasbauer (1999).

Distribution Map for Glamis Night Tiphid, *Sedomaya glamisensis*

A2007D



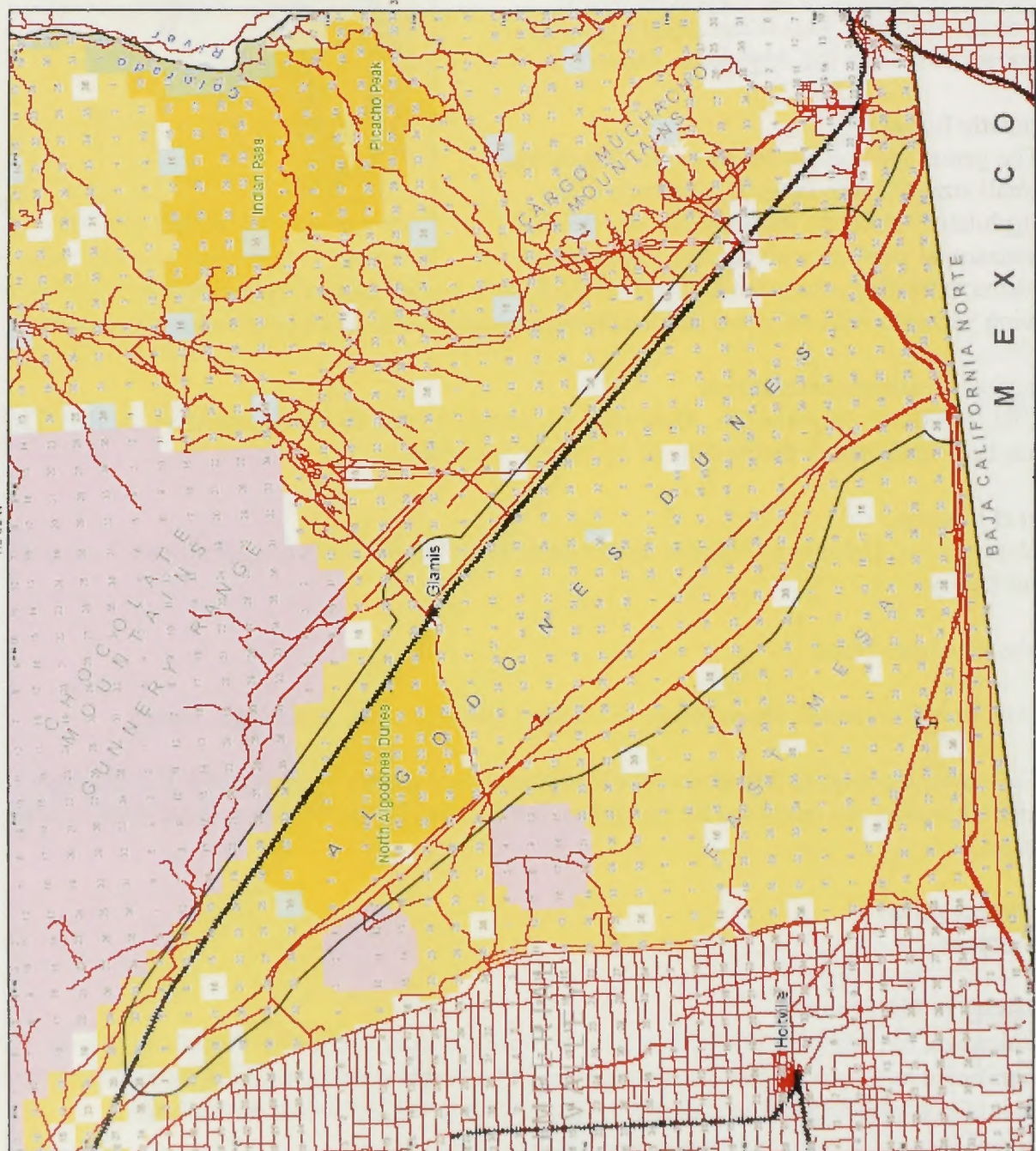
Scales 1:50,000



Map Source



U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT
1515 W. 10th Street
Sacramento, California
95811-0700
www.blm.gov
Project: 20, *Sedomaya glamisensis*, 2001001401



Distribution map of *Sedomaya glamisensis*.

Section 3. Insects Appearing on Various Lists but Not Endemic to the Dunes

Hairy Night Mutillid

Odontophotopsis villosa Mickel

(Hymenoptera: Mutillidae)

Taxonomy

Odontophotopsis villosa Mickel 1983 (in Mickel and Clausen 1983):550. Holotype male; California: Riverside Co., Palm Springs (types deposited in the University of Minnesota).

Diagnostic features

Males are winged, female are unknown but should be wingless as is typical for the genus.

O. villosa resembles *unicornis* Schuster and *erebus* (Melander) but can be distinguished by having the mandibles only weakly excised ventrally, the clypeus weakly tuberculate, shorter marginal cell, and the presence of an elevated carina on metasomal sternum II.



Odontophotopsis villosa male, side view.

Collection localities/distribution

CALIFORNIA: Imperial Co., 5 mi southwest Glamis, Algodones Dunes south Ruthven, 3 mi. north Glamis, 7 mi southeast Glamis, Holtville; Riverside Co.: Palm Springs, Thousand Palms; 38 specimens were examined. The species is collected in the months of April, July and September. It is found in Riverside and Imperial Counties.

Natural history

Biology. Unknown. Members of this family are all parasitoids on other insects, particularly bees and sphecid wasps.

Habitat requirements. Sand dunes.

Collecting techniques. Black light trap (males), pitfall traps (females).

Population status

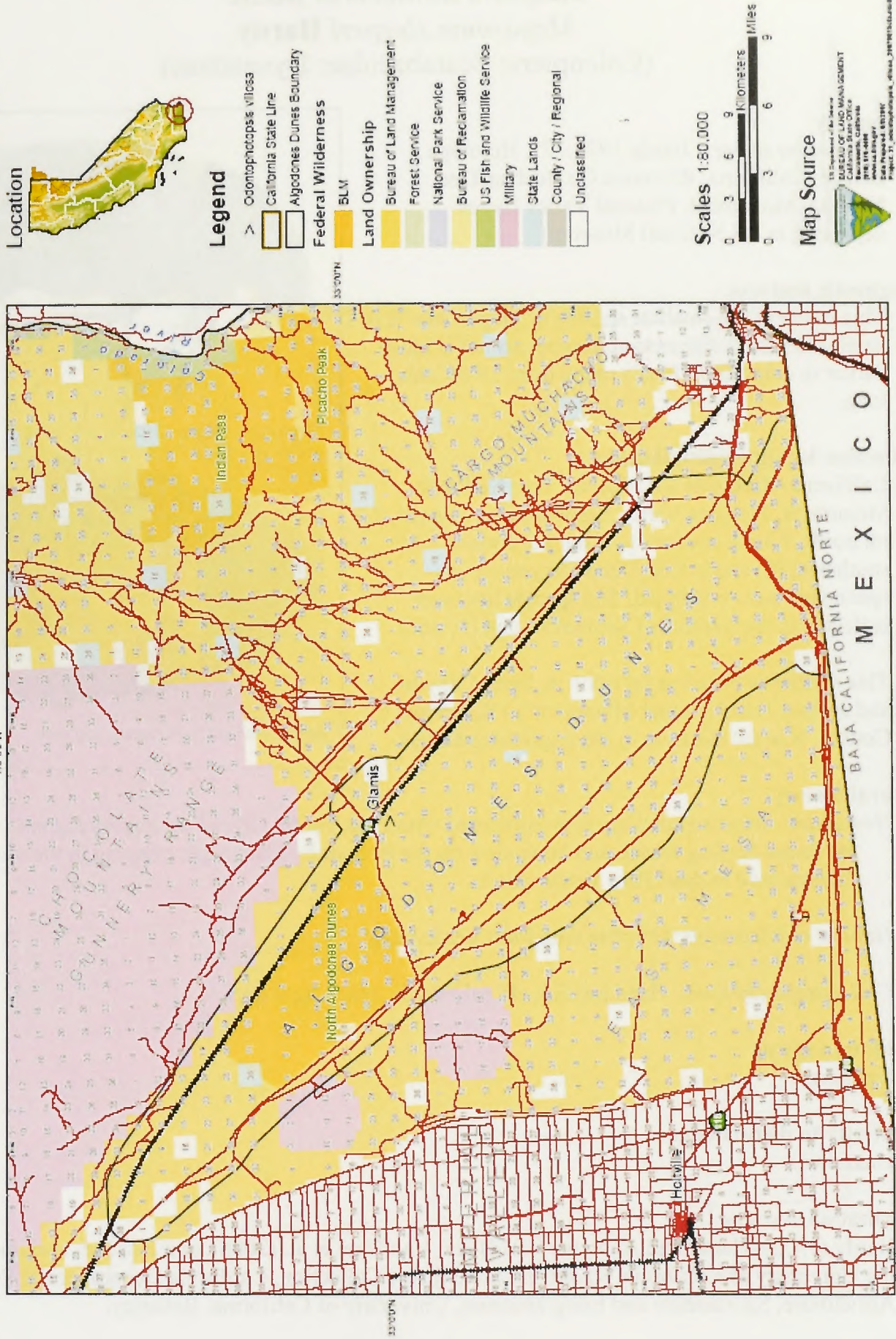
Unknown.

Information sources

Museum specimens from Utah State University, Logan, and the State Insect Collection, California Department of Food & Agriculture, Sacramento. Information was also taken from Mickel and Clausen (1983).

Distribution Map for Hairy Night Mutillid, *Odontophotopsis villosa*

A2007D



Distribution map of *Odontophotopsis villosa*.

Sleeper's Rhinoceros Beetle
***Megasoma sleeperi* Hardy**
 (Coleoptera: Scarabaeidae: Dynastinae)

Taxonomy

Megasoma sleeperi Hardy 1972:775. Holotype female; California; Riverside Co. Joshua Tree National Monument, Pleasant Valley (types deposited in US National Museum).

Diagnostic features

This is one of the smallest species of *Megasoma*. It is similar in size to *Pseudocatalpa* species but is much darker in color. Individuals range from 25-30 mm long.

Collection localities/distribution

California: Riverside Co.: Joshua Tree National Monument, Pleasant Valley; Imperial Co.: Glamis, 2 mi north, 1.3 mi. southwest, 3 mi. northwest, 7 mi. southeast; Riverside Co.: Deep Canyon; seven specimens were examined. The species has been collected in the months of September and October.

This species is found as far north as Deep Canyon and Joshua Tree National Monument in Riverside County. It is not endemic to the Algodones Dunes.

Natural history

Host plants. *Megasoma sleeperi* is associated with Palo Verde, *Cercidium macrophyllum*. Adults can be found feeding on sap and honeydew on the trees or by black light trapping in the vicinity. Larvae feed in dead Palo Verde wood.

Habitat requirements. Habitats with Palo Verde trees.

Collecting techniques. Hand picking off palo verde, black light trap.

Population status

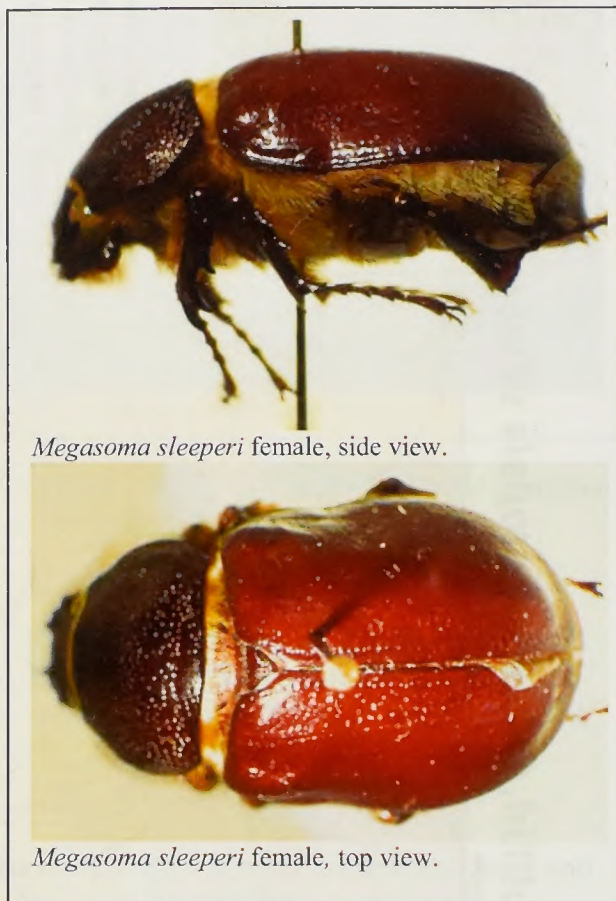
Unknown.

Sensitivity to disturbance

Unknown.

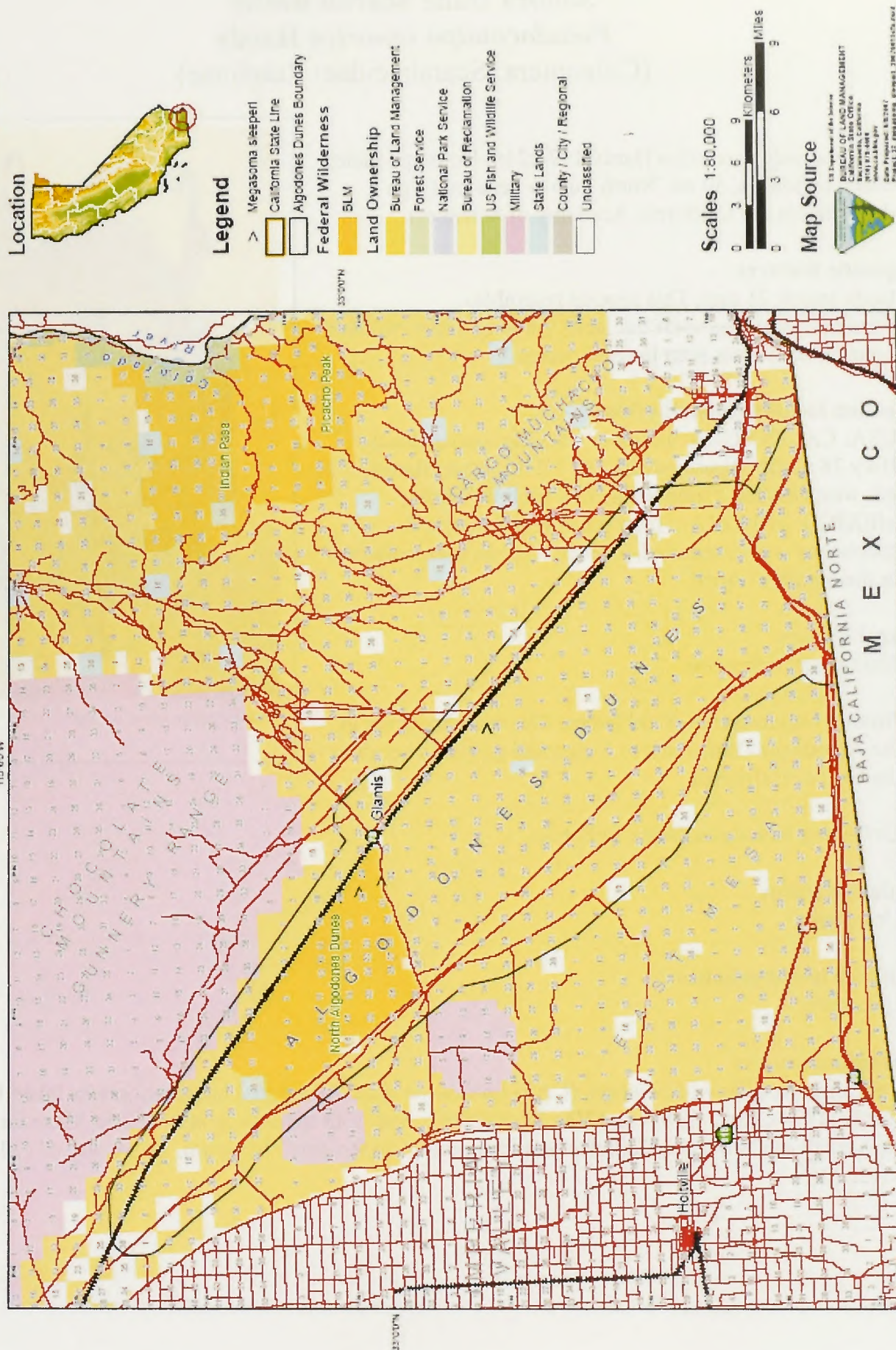
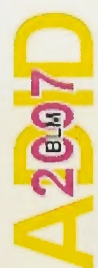
Information sources

Hardy (1972), Hardy and Andrews (1974) and Van Dam et al. (2006), and museum specimens from the University of California, Riverside; State Insect Collection, California Department of Food & Agriculture, Sacramento and Essig Museum, University of California, Berkeley.



Megasoma sleeperi female, side view.

Megasoma sleeperi female, top view.



Distribution map of *Megasoma sleeperi*.

Sonora Dune Scarab Beetle
***Pseudocotalpa sonora* Hardy**
 (Coleoptera: Scarabaeidae: Rutelinae)

Taxonomy

Pseudocotalpa sonora Hardy 1974:246. Holotype male; Mexico: Sonora, 50 mi. North Puerto Penasco (type deposited in the California Academy of Sciences).

Diagnostic features

Body length 21 mm. This species resembles *Pseudocotalpa andrewsi* but lacks the long dense, whitish setae on the venter seen in that species.

Collection localities/distribution

USA: CALIFORNIA: Imperial Co., Algodones dunes, Hwy 78 north Osborne overlook, 1.5 mi. west Glamis, 3.9 mi. west Glamis, Yuma Sand Hills (below Yuma); MEXICO: SONORA: 50 mi southwest Sonoita; 7 specimens were examined. The species has been collected in the month of April.

Natural history

Host plant. Unknown.

Habitat requirements. Sand dunes. The species occurs in the Algodones Dunes east to Yuma and probably south to the Gulf of California.

Collecting technique. Black light trap.

Population status

Unknown.

Sensitivity to disturbance

Unknown.

Information sources

California Academy of Sciences (CAS) houses the type. Additional information was taken from Hardy (1974), Rust (1985) and Van Dam (2006), and from specimens in the Essig Museum, University of California, Berkeley and Entomological Research Museum, University of California, Riverside.



Pseudocotalpa sonoriac, top view.

Location

Legend

- \triangleright *Pseudotsuga sonchifolia*
- California State Line
- Algodones Dunes Boundary
- Federal Wilderness
- SLM
- Land Ownership
- Bureau of Land Management
- Forest Service
- National Park Service
- Bureau of Reclamation
- US Fish and Wildlife Service
- Military
- State Lands
- County / City / Regional
- Unclassified

Scales 1:80,000

0 3 6 9 Kilometers
0 3 6 9 Miles

Map Source

US Department of the Interior
BUREAU OF LAND MANAGEMENT
CALIFORNIA STATE OFFICE
Sacramento, California
www.blm.gov
Data Prepared: 08/2007
Project: 22_pseudotsuga_sonchifolia_20070810.mxd

Map Labels: Glamis, North Algodones Dunes, Indian Pass, Picacho Peak, Colorado River, Colorado Mountains, MEXICO, BAJA CALIFORNIA NORTE, HORVILL, 33°00'N, 115°00'W

Distribution map of *Pseudocotalpa sonora*.

References

- Barr, W. F. 1969. New species of *Hippomelas* and *Acmaeodera* from Western North America (Coleoptera: Buprestidae). *Journal of the Kansas Entomological Society* 42(3):321-335.
- Barr, W. F. and P. D. Hurd, Jr. 1947. Notes on the *Dasyneutilla* of the Palo Verde Valley, California with the description of a new species. *Pan-Pacific Entomologist* 23(2):85-90.
- Bohart, R. M. 1982. New species of *Stictiella*. *Journal of the Kansas Entomological Society* 55:593-597.
- Bohart, R. M. 1989. A review of the genus *Euparagia* (Hymenoptera: Masaridae). *Journal of the Kansas Entomological Society* 62(4):462-467.
- Bohart, R. M. and J. E. Gillaspay. 1985. California sand wasps of the tribe Stictiellina. *Bulletin of the California Insect Survey* 27:1-89.
- Cazier, M. A. 1985. New species and notes on flies belonging to the genus *Apiocera* (Diptera, Apioceridae). *American Museum Novitates* (2837):1-28.
- Forbes, G. S. 1988. Three new species of *Efferia* from southern California and Arizona (Diptera: Asilidae). *Annals of the Entomological Society of America* 81(4):554-559.
- Griswold, T. L. 1996. A new *Microbembex* endemic to the Algodones Dunes, California (Hymenoptera: Sphecidae). *Pan-Pacific Entomologist* 72(3):142-144.
- Hardy, A. R. 1971. The North American Areodina with a description of a new genus from California. *Pan-Pacific Entomologist* 47:235-242.
- Hardy, A. R. 1972. A brief revision of the North and Central American species of *Megasoma* (Coleoptera: Scarabaeidae). *Canadian Entomologist* 104(5):765-777.
- Hardy, A. R. 1974. A new species of *Cyclocephala* Latreille from California sand dunes *Pan-Pacific Entomologist* 50(2):160-161.
- Hardy, A. R. 1974. Two new species of *Pseudocotalpa* Hardy (Coleoptera: Scarabaeidae). *The Pan-Pacific Entomologist* 50:241-247.
- Hardy, A. R. 1976. A new species of *Anomala* Samouelle from California sand dunes. *International Union for Conservation of Nature Bulletin* 30(4):365-367.
- Hardy, A. R. and F. G. Andrews. 1974. Observations on *Megasoma* with behavioural notes on some lamellicorn beetles associated with sand dunes (Coleoptera: Scarabaeidae, Lucanidae). *Pan-Pacific Entomologist* 50(2):124-128.
- Hardy, A. R. and F. G. Andrews. 1980. An inventory of selected Coleoptera from the Algodones Dunes. A report to the Bureau of Land Management. Insect Taxonomy Laboratory, California Department of Food & Agriculture, Sacramento, CA.
- Hardy, A. R. and F. G. Andrews. 1986. Studies in the Coleoptera of western sand dunes. 2. Notes on four Scarabaeidae from the Algodones dunes system. *Coleopterists Bulletin* 40(2):127-139.

- Kimsey, L. S. and M. S. Wasbauer. 1999. New genera and species of brachycistidine wasps from southwestern North America. *Journal of Hymenoptera Research* 8(1):65-73.
- Manley, D. G. 1928. Synonymy of *Dasymutilla nocturna* Mickel (Hymenoptera: Mutillidae). *Pan-Pacific Entomologist* 75(1):18-22.
- Manley, D. G. 2005. A new color variant of *Dasymutilla atricauda* Mickel from Imperial County, California (Hymenoptera: Mutillidae). *Pan-Pacific Entomologist* 81(3-4):184-185.
- Manley, D. G. and J. P. Pitts. 2004. Two new species of black *Dasymutilla* from Texas and California. *Journal of the Kansas Entomological Society* 77(4):644-649.
- Mickel, C. E. 1928. Biological and taxonomic investigation on the mutillid wasps. *Bulletin of the U.S. National Museum* (143):1-351.
- Mickel, C. E. 1928. Biological and taxonomic investigations on the mutillid wasps. *Bulletin of the U. S. National Museum* 143:1-351.
- Mickel, C. E. and P. J. Clausen. 1983. New species of the genus *Odontophotopsis* subgenus *Odontophotopsis viereck* (Hymenoptera: Mutillidae) of North America. *Annals of the Entomological Society of America* 76(3):539-551.
- Nelson, G. H. 1994. *Agrilus harenus* Nelson, a new species from southern California, with notes on *A. lacustris* LeConte (Coleoptera: Buprestidae). *The Coleopterists Bulletin* 48(3):261-264.
- Nelson, G. H. and C. L. Bellamy. 1996. A revision of the subtribe Hippomelanina: *Hippomelas* Laporte and Gory, *Prasinalia* Casey, *Gyascutus* (Stictocera) Casey, and *Barrellus*, gen. nov. (Coleoptera: Buprestidae). *Journal of Natural History* 30:861-911.
- Pierce, W. D. 1975. *The sand dune weevils of the genus Trigonoscuta with a correlation of their anatomy to the geological history of our coast lines*, iii + 162 pp.[+2 pp. Addendum II, unnumbered], Orange, CA.
- Potts, R. W. L. 1976. New species of North American *Anomala* (Scarabaeidae: Anomalinae). *Pan-Pacific Entomologist* 52:220-226.
- Rust, R. W. 1985. Notes on the biology of *Pseudocotalpa giulianii* Hardy (Coleoptera: Scarabaeidae). *Pan-Pacific Entomologist* 61(2) 1985:105-109.
- Schuster, R. M. 1958. A revision of the Sphaerophthalminae Mutillidae of America north of Mexico, II. *American Entomologist* (N.S.)37:1-130.
- Timberlake, P. H. 1968. A revisional study of the bees of the genus *Perdita* F. Smith, with special reference to the fauna of the Pacific Coast (Hymenoptera, Apoidea) Part VII. *University of California Publications in Entomology* 49:1-196.
- Timberlake, P. H. 1980. Supplementary studies on the systematics of the genus *Perdita* (Hymenoptera, Andrenidae) Part 2. *University of California Publications in Entomology* 85:1-65.
- Van Dam, M. and A. 2006. Description of the larva of *Pseudocotalpa sonora* Hardy (Scarabaeidae: Rutelinae: Rutelini) with notes on life history. *Coleopterists Bulletin* 60(1): 31-36.

- Van Dam, M., A. Van Dam and M.D. Wilcox. 2006. Description of the third instar larva and adult male of *Megasoma sleeper* Hardy (Scarabaeidae: Dynastinae). *Coleopterists Bulletin* 60(1): 59-67.
- Velten, R. K. and C. L. Bellamy. 1987. A new genus and species of North American Coroebini Bedel with a discussion of its relationships within the tribe (Coleoptera: Bupresidae). *Coleopterists Bulletin* 41(2):185-192.

Table 1. Status of our knowledge of the insects reported as endemic to the Algodones Dunes. This list includes species listed in websites and unpublished literature as endemic to the dunes as indicated by an asterisk (*).

Genus species	Endemic to the Dunes	Life History Category	Larval stages
HYMENOPTERA			
<i>Perdita algodones</i>	yes	melliferous	unknown
<i>Perdita flavicincta</i> *	yes	melliferous	unknown
<i>Perdita frontalis</i> *	yes	melliferous	unknown
<i>Perdita glamis</i>	yes	melliferous	unknown
<i>Habropoda</i> n. sp.	yes	melliferous	unknown
<i>Dasymutilla imperialis</i>	no	parasitoid	unknown
<i>Dasymutilla nocturna</i>	no	parasitoid	unknown
<i>Odontophotopsis villosa</i>	no	parasitoid	unknown
<i>Spherophthalma ecarinata</i>	yes	parasitoid	unknown
<i>Microbembex elegans</i>	yes	scavenger	unknown
<i>Stictiella villegasi</i>	yes	predator	unknown
<i>Euparagia</i> n. sp.	yes	predator	unknown
<i>Sedomaya glamisensis</i>	yes	parasitoid	unknown
COLEOPTERA			
<i>Lepismadora algodones</i>	yes	phytophagous	unknown
<i>Prasinalia imperialis</i>	yes	phytophagous	unknown
<i>Agrilus harenus</i>	yes	phytophagous	unknown
<i>Anomala carlsoni</i>	yes	phytophagous	unknown
<i>Anomala hardyorum</i>	yes	phytophagous	unknown
<i>Cyclocephala wandae</i>	yes	phytophagous	unknown
<i>Pseudocotalpa andrewsi</i>	no	phytophagous	unknown
<i>Trigonoscuta rothi rothi</i>	yes	phytophagous	unknown
<i>Trigonoscuta rothi algodones</i>	yes	phytophagous	unknown
<i>Trigonoscuta rothi imperialis</i>	yes	phytophagous	unknown
<i>Trigonoscuta rothi punctata</i>	yes	phytophagous	unknown
DIPTERA			
<i>Apiocera warner</i>	yes	predator	unknown
<i>Efferia macroxipha</i>	yes	predator	unknown

Table 2. Natural history of species endemic to the Algodones Dunes.

Genus species	Seasonal Activity Period	Collecting Techniques	Food Type
HYMENOPTERA			
<i>Perdita algodones</i>	April	net, malaise trap	nectar, pollen
<i>Perdita flavicincta</i> *	unknown	net, malaise trap	nectar, pollen
<i>Perdita frontalis</i> *	July	net, malaise trap	nectar, pollen - <i>Eriogonum</i> , <i>Coldenia</i>
<i>Perdita glamis</i>	June	net, malaise trap	nectar, pollen
<i>Habropoda</i> n. sp.	April	net	nectar, pollen
<i>Spherothalma ecarinata</i>	April, July, Sept.	black light, pitfall	parasitoid
<i>Microbembex elegans</i>	Sept, Oct.	black light, pitfall	scavenger on dead insects
<i>Stictiella villegasi</i>	Oct., Nov.	net, malaise trap	predator on Lepidoptera
<i>Euparagia</i> n. sp.	June, July	net, malaise trap	predator
<i>Sedomaya glamisensis</i>		black light, pitfall	parasitoid
COLEOPTERA			
<i>Lepismadora algodones</i>	June-Sept.	net	wood - <i>Tiquilia</i>
<i>Prasinalia imperialis</i>	June, July	net	wood - <i>Eriogonum deserticola</i>
<i>Agrilus harenus</i>	June, July, Sept.	net	wood - <i>Croton wigginsii</i>
<i>Anomala carlsoni</i>	March-May	black light, pitfall	root feeder
<i>Anomala hardyorum</i>	Feb.-June	black light, pitfall	root feeder
<i>Cyclocephala wandae</i>	July-Aug.	black light, pitfall	root feeder
<i>Trigonoscute rothi rothi</i>	Jan.-March	pitfall	root feeder
<i>Trigonoscute rothi algodones</i>	April	pitfall	root feeder
<i>Trigonoscute rothi imperialis</i>	unknown	pitfall	root feeder
<i>Trigonoscute rothi punctata</i>	unknown	pitfall	root feeder
DIPTERA			
<i>Apiocera warner</i>	Sept.	net, malaise trap	generalist predator
<i>Efferia macroxipha</i>	Sept.	net, malaise trap	generalist predator

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Reports of Special Status Plant Species within the Planning Area

A. BLM Monitoring Reports 1978 through 2007

In 1998, the BLM initiated monitoring of six rare plant species. Monitoring was conducted in spring and summer 1998, spring 1999, spring 2000, spring 2001, and spring 2002. In 2001 and 2002, monitoring was restricted to PMV, Algodones Dunes sunflower, and sand food. Utilizing the study methodology of Westec Services, the dunes were divided into four geographic strata; 34 of the original 66 transects were randomly selected from those strata, and divided into cells. Numbers of rare plants were then recorded within 10 to 15 meters or fixed parallel transects in each of the cells. Abundance classes were assigned for each species in a cell (BLM 2000b). The report compared the responses of six rare plant species, as measured by abundance class data, over all 4 years of monitoring (1977 and 1998–2000). The study concluded that plants are at least as abundant and widespread in the entire dune system as they were in 1977. The report also noted that healthy populations of all six species remain in areas open to recreation, although the aboveground expression of populations of some of these species dramatically fluctuates with precipitation (BLM 2001b).

Monitoring conducted between 1998 and 2002 used an abundance class approach; however, this approach did not result in actual estimates of density and population size. The abundance class approach was replaced in 2003 with a pilot monitoring program to estimate the density and population size of PMV, Algodones Dunes sunflower, and sand food. The monitoring program was conducted in the North Algodones Dunes WA and in the Gecko area of the dunes. The 2003 monitoring program also estimated the canopy cover of the vegetation associated with these species (BLM 2004b).

In 2004, the monitoring program was expanded to all areas of the ISD Planning Area where PMV and Algodones Dunes sunflower were known to occur. Twelve sampling areas were surveyed resulting in density and population size estimates as well as estimates of the canopy cover of the perennial plants associated with the special status plants (BLM 2005d).

In 2005, based on results of the 2004 monitoring program, survey sampling was intensified in order to achieve more precise estimates of the density and population size of PMV. A total of 16 areas were sampled in 2005 also resulting in density and population size estimates as well as estimates of the canopy cover of the perennial plants associated with the special status plants (BLM 2005e).

Monitoring in 2006 was similar to that conducted in 2005. The 2006 survey also included the acquisition of aerial photography, which was used to determine OHV use patterns in PMV habitat and investigate the potential negative correlation between the level of OHV use and the number of PMV plants present (BLM 2006d).

In 2007, a pilot study to determine the feasibility of sampling the seed bank of PMV was initiated with assistance from the USFWS. Five sampling areas were chosen based on the location of the highest densities of PMV discovered in 2005 (BLM 2007c).

The following is a species-by-species summary of BLM monitoring studies conducted between 1998 and 2007.

A.1 Peirson's Milk-vetch

Abundance was closely tied to precipitation throughout the four years of monitoring. Species abundance was highest in 1998, second highest in 1977, third highest in 1999, and lowest in 2000. This mirrors the ranking of the four growing seasons in terms of average precipitation. Recruitment was possibly high in 1998 and low to nonexistent in 1999 and 2000. Responses of this species were similar in both the closed and open recreation areas across all 4 years of monitoring. Results from monitoring conducted in 2001 and 2002 had similar results as previous years, supporting the conclusion that PMV respond more like an annual than a perennial species (BLM 2004a).

The 2003 pilot monitoring program resulted in PMV population estimates of 59,591 (total population size) within the North Algodones Dunes WA (eight belt transects) and 115,267 in the Gecko area (nine belt transects). Density estimates were 23 plants/hectare (all plants) in the WA and about 31 plants/hectare in the Gecko area. The vast majority (99 percent) of plants encountered during 2003 surveys were seedlings, which was considered an anomaly compared to previous years. It was suspected that something, perhaps the temperatures at the time of germination, during the 2002-2003 growing season triggered a much higher germination response than seen in previous survey years (BLM 2004b).

In 2004, an estimated 286,374 PMV plants were found within seven management areas of the ISD SRMA. The estimated density of PMV was 13.5 plants/hectare. Densities were highest in the Ogilby and Gecko areas, with few plants found in the Buttercup and Mammoth Wash areas. As seen in 2003, the majority of plants encountered in 2004 were seedlings and juveniles (94 percent). Fewer plants were observed in the WA and Gecko areas in 2004 than in 2003, despite similar rainfall amounts and timing of surveys. The patterns seen in 2003 and 2004 were very different from those seen in previous years (1998 to 2002 monitoring). It was suspected that higher temperatures during germination than experienced in 2003 may account for the difference. Less than 1 percent of the PMV plants found showed evidence of vehicle damage (likely OHV) (BLM 2005d).

Rainfall in October 2004 likely contributed to a favorable germination and establishment year as seen in surveys conducted in 2005. An estimated 1,831,076 PMV plants were found within seven management areas of the ISD SRMA. The estimated density of PMV in 2005 was 86.3 plants/hectare. Densities were highest in the Ogilby area, with few plants found in the Glamis area. As opposed to 2003 and 2004, approximately 75 percent of plants encountered in 2005 had flowered at the time of transect surveys. The percentage of plants flowering in the spring of 2005 was similar to percentages observed from 1998 to 2002. The majority of plants encountered were less than 1 year old, supporting the contention that PMV typically functions more like an annual than a perennial and that the majority of seeds in the seed bank are likely produced from the current year plants in good rainfall years. Less than 1 percent of the PMV plants found showed evidence of vehicle damage (likely OHV; BLM 2005e).

Rainfall in the 2005-2006 growing season was only about 10 percent of the annual average, with the majority of rainfall occurring in March 2006, likely too late in the season to trigger any significant germination by PMV. An estimated 83,451 PMV plants were found within seven management areas of the ISD SRMA. The estimated density of PMV in 2005 was 3.9 plants/hectare. Densities were highest in the Mammoth Wash area (likely due to early monitoring in this area), with few plants found in the Buttercup area. Approximately 68 percent of plants encountered in 2005 had flowered at the time of transect surveys (BLM 2006d).

In 2006, aerial photography was taken during Presidents Day weekend to determine if a relationship existed between the level of OHV recreation (as measured by vehicle track cover) and the number of OMV plants in an area. A slight negative relationship between OHV recreation and the number of PMV plants was determined; however, this relationship was not statistically significant ($P > 0.05$). More importantly, only one percent of the variability in the number of plants can be explained by OHV recreation. This indicates that other factors that were not examined in the study (e.g., habitat, position in the dunes) likely have a much greater effect than OHV recreation on the spatial variability in PMV abundance (BLM 2006d).

Importance of the PMV seed bank has been researched and shown to be significant for the long term survival of the species. Based on this information, BLM decided to focus the 2007 monitoring efforts on determining the feasibility of estimating the number of PMV seeds in the ISD seed bank. A random sampling methodology was used, resulting in an estimated 53,200,000 seeds in sampled areas, corresponding to a density of 6,356 seeds/hectare. Approximately 30 percent of seeds found on the surface were still contained in pods, while 3 percent of buried seeds were still in pods. Seed densities were found to be highest in the central portion of the ISD (previously called the Adaptive Management Area) and lowest in the Gecko area. Seed densities were significantly lower in areas where OHV recreation occurs and highest in areas closed to OHV recreation (BLM 2007c).

In 2007, an estimated 293,102 PMV plants were found within seven management areas of the ISD SRMA. The estimated density of PMV was 35 plants/hectare, most were seedlings and juveniles (83 percent). Densities were highest in the Gecko area (BLM 2007c).

A.2 Algodones Dunes Sunflower

Abundance increased significantly between 1977 and 1998. This increase was the result of a large increase in the values for the open area between 1977 and 1998. There were only slight decreases in abundance for 1999 and 2000. Between 1977 and 1998, the species declined in abundance in the closed area. This could have been the result of lower recruitment of individuals into the population in the closed area. With the exception of 1977, the responses in the open and closed areas were parallel.

The 2003 pilot monitoring program resulted in Algodones Dunes sunflower population estimates of 513,710 (total population size) within the North Algodones Dunes WA (eight belt transects) and 406,391 in the Gecko area (nine belt transects). Density estimates were 198 plants/hectare (all plants) in the WA and about 109 plants/hectare in the Gecko area. The majority of Algodones Dunes sunflower plants encountered were also seedlings (similar to PMV), 92 percent. Germination response to the 2002–2003 season was similar to that seen for the PMV (BLM 2004b).

In 2004, an estimated 1,965,298 Algodones Dunes sunflower plants were found within seven management areas of the ISD SRMA. The estimated density of PMV was about 93 plants/hectare. Densities were highest in the Glamis area, with few plants found in the Buttercup area. As seen in 2003, the majority of plants encountered in 2004 were seedlings and juveniles (86 percent). Approximately 0.1 percent of the Algodones Dunes sunflower plants found showed evidence of vehicle—likely OHV—damage (BLM 2005d).

Rainfall in October 2004 likely contributed to a favorable germination and establishment of Algodones Dunes sunflower plants in 2005. An estimated 10 million seedlings germinated, and an estimated 325,122 adult plants were found within seven management areas of the ISD SRMA. Approximately 0.6 percent of the Algodones Dunes sunflower plants found showed evidence of vehicle—likely OHV—damage. The highest percentage of damaged plants was found in the Buttercup area, likely the result of a higher concentration of OHV recreation than in other areas (BLM 2005f).

A.3 Wiggins' Croton

Abundance in 1977 was about half of 1998. Abundance for 1999 and 2000 was similar to 1998. This increase may represent a real increase in the population size of this species in the dune system. Most of this increase was detected in the open area. Comparison of abundance in the closed and open areas indicate—except for 1977,

when abundance was similar for both areas—that abundance in open areas was consistently higher.

A.4 Giant Spanish Needle

Abundance was highest in 1998, the best rainfall year. However, abundance was second highest in 2000, the lowest rainfall season. The reason for the relatively high abundance in 2000 was unclear. Based on rainfall, it was expected that 1977 would have the second highest abundance. Instead, 1977 abundance ranked third and 1999 ranked last. The abundance between closed and open areas is very similar for 1977, 1998, and 1999, while in 2000 abundance was greater in the closed area. Data also appear to indicate that this species is more common in the northern part of the dunes, independent of whether the area is closed or open.

A.5 Sand Food

Abundance increased between 1977 and 2000, with the highest abundance registered for 2000, the worst rainfall year. The reason for the relatively high abundance in 2000 was unclear. The second highest abundance was 1998, and 1999 abundance was very close to 1998. Abundance for this species in closed and open areas was the same for 1999. In 1998 and 2000, abundance for the closed areas was higher than open areas. However, this determination may have been due to a limitation in the survey method. In 1998, 1999, and 2000, transects were conducted on foot in the closed area, while those in the open area were run from a dune buggy. Additionally, in 1977, closed areas had lower abundance than open. This, too, may have been due to a limitation in the survey method. The 1977 survey utilized a helicopter in closed areas, not the ideal survey method to detect this cryptic plant.

The 2003 pilot monitoring program resulted in sand food population estimates of 34,440 (total population size) within the North Algodones Dunes WA (nine belt transects) and 13,586 in the Gecko area (nine belt transects). Density estimates were 13 plants/hectare (all plants) in the North Algodones Dunes WA and about four plants/hectare in the Gecko area (BLM 2004b).

In 2004, an estimated 46,470 sand food inflorescences (all that is visible above ground) were found within seven management areas of the ISD SRMA. The majority of plants (highest density) were found in the Mammoth Wash area and WA (BLM 2005d).

A.6 Borrego Milk-vetch

Abundance was essentially the same in 1977 and 1998. No plants at all were found in either 1999 or 2000, a statistically significant decline from 1977 and 1998 levels. Presumably, precipitation was insufficient for growth and establishment in 1999 and

2000. No comparison of abundance between closed and open areas was made, because this taxon did not occur in the closed area.

B. Thomas Olsen and Associates Report

In 2001, the American Sand Association (ASA) retained the services of Thomas Olsen and Associates to provide an independent assessment of the abundance, distribution, and life history of the PMV at the Imperial Sand Dunes. Additional distribution and abundance data were also collected on five other rare plants. As opposed to the BLM monitoring study, this study was designed to obtain an actual census of PMV. The other five plant species were also counted when they were observed with PMV. A nonprobabilistic survey was employed to determine areas for survey. As a first step in the survey methodology interviews of OHV users, BLM staff, and Border Patrol officers who were familiar with the project area were conducted to determine locations of PMV. The second step included a general reconnaissance of the entire dune areas outside the interim closures and WA. The third step consisted of actual intensive surveys of specific areas based on professional knowledge of habitat requirements of the species, reconnaissance information, and feedback from the interviewees (TOA 2001).

The team surveyed by foot and rail within the open areas. When a substantial number of plants were detected, the area was designated as a "site." A number was assigned to each site, and a team of two to three biologists conducted a census of the plants and recorded other habitat characteristics. Areas that were too small to circumscribe on a map or contained a small number of plants were designated as "points." Additionally, the team conducted an aerial survey by helicopter of the interim closure areas. Parallel transects or concentric circles of decreasing diameter were flown within each of the closure area boundaries south of SR-78 and a portion of the North Algodones Dunes WA north of the highway.

The survey produced a total of 61 sites and 66 points containing one or more of the rare plants within the dunes. Notable concentrations were found in several areas, which included: 1) the southern portion of the dunes near the international border and west of Buttercup Valley; 2) the area near Patton Valley, south of the large closure and west of the dune peaks; 3) between the small central closure and the large central closure; and 4) the east side of the small central closure.

The general conclusion from this study was that the distribution of the rare plants is dependent on the geomorphology of the dunes, and they tend to be concentrated in areas where there is relative substrate stability. These are areas located generally on the lee side of the large dunes, in areas where the surface gradually slopes upwards from deep or shallow basins at the base of steep slipfaces. The study also concluded that less than 1 percent of the plants had been affected by OHVs (TOA 2001).

The following is a species-by species summary of the TOA study:

B.1 Peirson's Milk-vetch

A grand total of 71,926 individual plants were recorded. Occurrences were clustered in general areas, and no PMV was detected in large portions of dunes. Generally, plants were found west of the primary dunes in the open areas. The greatest number of plants found at a single site was 3,994 in the southern border area.

B.2 Algodones Dunes Sunflower

This species was detected in 31 of 61 PMV sites, for a total count of 1,289, scattered throughout the primary dunes. The greatest estimated number of plants at a single site was 431 individuals.

B.3 Wiggins' Croton

This species was found at 52 of 61 PMV sites for a total count of 3,614. They were found evenly distributed throughout the open areas, sharing generally the same habitat as PMV.

B.4 Giant Spanish Needle

This species was found at 47 of 61 PMV sites for a total count of 4,191 individuals. Most of the occurrences were south of the Central Closure #2 and south of I-8.

B.5 Sand Food

A total of 65 plants were found at nine scattered sites and points, most notably in the Gecko Road area and the area just south of Central Closure #2.

B.6 Borrego Milk-vetch

The preferred habitat at the Plan Area for the Borrego milk-vetch, which is on the eastern portion of the dune system, was generally not surveyed during this study. However, a single site with 15 individuals was detected on the eastern edge of the dunes.

C. Westec Services, Inc. Report

Westec Services, Inc. carried out the initial survey of rare plants in the Imperial Sand Dunes under contract with the BLM in 1977. They surveyed for eight rare plants, of which seven were found. To determine species abundance, Westec surveyed 66 west-east, randomly selected parallel transects that were segmented into cells 0.45-mile per side (Westec 1977). It must be noted that the Westec study was not specifically designed to study OHV impacts, and the conclusions are based on a single-year study. The study offered the following conclusions:

- Seedlings of rare species could not be found in “high impact areas,” while seedlings of these species were abundant in other areas of the dunes.
- Intensity of OHV use in the dunes appears to be the key factor in impacting dune vegetation. Greatest impact occurs within the heaviest use areas.
- Lower level of “secondary impact” occurs throughout the dunes. However, this sporadic impact appears to decrease with increasing distance from the center of high impact areas.
- Despite the observed impacts, healthy reproducing populations of all rare plant species occurred within the dunes.

D. Luckenbach and Bury Report

The Luckenbach and Bury study conducted in 1983 at the ISD is perhaps one of the most significant studies that systematically addressed OHV impacts to the dune biota. However, the study has limited utility toward drawing conclusions with respect to rare plants, since most of the study plots had none of these species in them. Another limitation is that the study compared sites with heavy OHV use to sites with no OHV use, which does not allow inferences to be made to less heavily used OHV sites. Also, what data were collected showed that PMV density and cover were actually higher in the OHV area than in the closed control area. The following are the conclusions of this study:

- OHV activities in the dunes are highly detrimental to dune biota.
- Both herbaceous and shrubby perennial vegetation is reduced greatly in areas where OHVs operate.
- Most commonly, plants were destroyed by direct destruction or damage to root systems of psammophytic shrubs.

- Changes due to OHV impacts may result in substrate changes, such as compaction, reduced porosity, altered thermal structure, and reduced moisture content, although these effects were not tested.

E. ECOS, Inc. Report

In 1990 Ecos, Inc. was contracted by BLM to perform habitat characterization and rare plant species analysis as well as to design a long-term monitoring plan. This study did not count the total number of plants; instead, the plant population fitness was analyzed by scoring a set of variables for each species. This study concluded that substantially less vegetative cover and species diversity were observed as an effect of OHV use. However, a limitation of this study is that it was conducted in a year of severe drought and that study sites in the open OHV area were located relatively close to OHV staging areas. Therefore, the observations on OHV impacts to plant species do not apply to most of the OHV open area.

APPENDIX I

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D. Lockenbach and Dory Report

The Lockenbach and Dory report, dated 1972, is a study of the Imperial Sand Dunes. The report was prepared by the Imperial County Board of Supervisors. The report contains information about the dunes, the surrounding area, and the impact of the proposed project on the dunes. The report also contains recommendations for the project and for the management of the dunes.

- 1. The report contains information about the dunes, the surrounding area, and the impact of the proposed project on the dunes.
- 2. The report also contains recommendations for the project and for the management of the dunes.
- 3. The report is a valuable resource for anyone interested in the Imperial Sand Dunes.

U.S. DEPARTMENT OF THE INTERIOR
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COOPERATIVE FIRE PROTECTION AGREEMENT
Between

THE UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
CALIFORNIA AND NEVADA

UNITED STATES DEPT. OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
APPENDIX I

UNITED STATES DEPT. OF AGRICULTURE
FOREST SERVICE
REGIONS FOUR, FIVE AND SIX
and

STATE OF CALIFORNIA
DEPARTMENT OF FORESTRY
AND FIRE PROTECTION

IN ACCORDANCE WITH

Acts of Congress of April 24, 1901 (16 USC 572), May 27, 1908 (42 USC 1856 et seq.), December 12, 1975 (16 USC 563 a-1), June 28, 1934 (43 USC 315a), October 21, 1976 (43 USC 1701), the
Stafford Act, Public Law 93-288, as amended (42 USC 5121 et seq.) and California Public Resources
Code, Section 4141

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APPENDIX I

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1. THIS AGREEMENT concerns "Wildland Fire Protection" and is made and entered into as of January 1, 2002, by and between the State of California, through its Director of the Department of Forestry and Fire Protection, hereinafter called the State, and the U.S. Department of Agriculture - Forest Service, through its Regional Foresters for Regions Four, Five and Six (Intermountain, Pacific Southwest and Pacific Northwest Regions), herein after called the Forest Service, the U.S. Department of the Interior - National Park Service through its Regional Director for the Pacific West Region, hereinafter called the Park Service, and the U.S. Department of the Interior - Bureau of Land Management, through its State Directors for California and Nevada, hereinafter called the Bureau. Forest Service, Park Service and Bureau may hereinafter be jointly referred to as Federal Agencies.

RECITALS

2. "State Responsibility Area " (SRA), sometimes called State and Private lands, upon which the State is responsible for wildland fire protection under California Public Resources Code Sections 4125 to 4127, National Forest Lands for which the Forest Service is responsible, National Park Lands for which the Park Service is responsible, and Public Lands for which the Bureau is responsible, are intermingled or adjacent in some areas, and "wildland" fires on these intermingled or adjacent lands present a threat to the lands of the other. For the purposes of this agreement, lands administered by the Federal Agencies shall be known as "Federal Responsibility Area (FRA)."
3. The State and Federal agencies acknowledge that differences exist between agency missions, but that each will represent the other agency's interests and must possess the recognition, knowledge and understanding of each other's mission objectives, authorities and policies. To the extent that "incident" objectives allow, each agency agrees to honor and aggressively pursue remedies to emergency fire situations that are consistent with what the other agency would have done had it been present. In "unified command" incidents, Incident Commanders must recognize each agency's mission objectives, authorities, and policies and agree as to how they will operate in compliance with same.
4. To provide a level of wildland fire protection for the intermingled lands "equivalent" to similar lands protected directly by the State or the Federal Agencies, the said intermingled and adjacent lands have been divided into practical "Direct Protection Areas" (DPAs) delineated by boundaries regardless of statutory responsibility, and this protection is assumed by administrative units of either the Federal Agencies or the State.
5. The Federal Agencies and the State have agreed upon and have caused to be delineated upon maps filed in the offices of each agency the DPAs in which each assumes the responsibility of maintaining a wildland fire protection system. Said maps show the established DPAs and are kept current on an annual basis in accordance with Exhibit E, Changes to Direct Protection Area (DPA). CDF Fire Protection Headquarters Section will be the repository for the master set of maps.

6. The State and the Federal Agencies need to assist each other on “suppression” of wildland fires adjacent to DPA boundaries and make provisions for use of each other's fire protection resources.
7. The State and the Federal Agencies have established fire plans applicable to their respective DPAs. Such plans describe the personnel, equipment and administrative support necessary to provide acceptable levels of wildland fire protection capabilities to meet agency objectives.
8. The State and the Federal Agencies desire to cooperate to the maximum extent possible to achieve objectives of common interest and concern. The concept of a functionally integrated fire protection system, involving Federal, State and Local government resources, is the most effective method of delivering fire protection where life, property and natural resource values are at risk.
9. Words and phrases used herein may have different meanings or interpretations for different readers. In order to reach a common understanding, words and phrases are included in a Glossary attached hereto as EXHIBIT A. The first time a word or phrase contained in the Glossary is used in the agreement or an exhibit, it will appear in quotation marks.

NOW, THEREFORE, in consideration of the mutual promises and conditions herein made, it is agreed as follows:

TERMS AND CONDITIONS

INTERAGENCY COOPERATION

10. Interagency Annual Meetings

Meetings with representatives from each signatory agency are recommended annually to ensure the cooperative goals of this agreement are being met. These meetings are intended to be meetings of the Program Directors and Agency Chiefs with Fire Program responsibility.

These meetings are intended to be opportunities for top-level management to discuss any issues and share all information needed for the most efficient cooperation between the fire agencies. Other levels of the agencies, like zones and local units, are encouraged to meet as necessary for their efficient interagency operations. Representatives at any level of the agencies are encouraged to meet with all or individual agencies as needed whenever issues indicate a need.

11. "California Wildfire Coordinating Group"

This agreement is evidence of the level of cooperation and integration between major wildland fire protection agencies in California. However, changes will continue to occur over the duration of this agreement, as well as many daily issues that cannot be addressed in such a document. To ensure a coordinated approach to resolution of such changes and issues, the parties to this agreement agree to participate in the California Wildfire Coordinating Group. To facilitate representation of the Forest Service at meetings of this group, as well as for other on-going routine issues, the Regional Forester for Region Five (Pacific Southwest), or his/her designee, in coordination with Region Four and Region Six, will represent all Forest Service Regions covered by this agreement.

12. Interagency Technical Committees

The State and Federal Agencies may charter interagency technical committees to study areas of concern, including but not limited to communications, training, field operations, information systems, dispatching, "fire prevention", aviation and fiscal issues.

DIRECT PROTECTION AREAS (DPAs)

13. DPA Boundaries

DPA boundaries will delineate the dividing line between land that will be provided wildland fire protection by the State and land that will be provided wildland fire protection by the Federal Agencies. DPA boundaries will be established by mutual consent.

Existing protection organization and facilities, response time, land ownership patterns, values to be protected and pertinent statutes and regulations will be considered when determining the location of the DPA boundaries. DPA boundaries will be recorded on "official maps" of the involved agencies.

The DPA boundaries will be reevaluated during preparation of each Operating Plan and during each "field review." When the need to change a DPA boundary is identified, the State Unit Chief and the Bureau Line Officer, Park Superintendent, or Forest Supervisor will recommend such a change for review and approval by the Director and appropriate State Director, Regional Director, or Regional Forester. Exhibit E delineates the process for documenting, approving and recording changes to DPA. Whenever such a change is contemplated, the remaining parties to this agreement that are not directly affected by the change shall be notified to review potential indirect effects. The Director, Regional Forester, Regional Director or State Director may initiate independent reviews of DPA boundaries.

The responsible parties will maintain accurate records of acreage involved in this agreement hereto.

14. Operating Plans

The State and Federal Agencies shall jointly develop and annually review "Operating Plans" which will document the location of the DPA boundary of each agency, and detail the subjects identified in the Operating Plan Outline attached hereto as EXHIBIT B. Operating Plans will be consistent with Federal Agency and State policy and the terms of this agreement and may be more detailed than the Outline.

An Operating Plan will be mutually prepared and approved by each Bureau Field Office, National Park Service Unit, or National Forest and the appropriate State Unit. The Operating Plan will be a local working document that is developed between the various Bureau Field Offices, National Forests, National Park Service Units and the appropriate State Units, and shall be an attachment to the Cooperative Fire Protection Agreement. It shall be forwarded to the CDF Director and the BLM State Director, NPS Regional Director, or FS Regional Forester by May 15, following approval by the designated State representative and the Bureau Line Officer, Park Superintendent or Forest Supervisor.

15. Protection of State Responsibility Area (SRA)

The State and the Federal Agencies shall jointly develop and review the Operating Plan for the protection of SRA located within Federal Agency DPAs. As identified in the Operating Plan, the Federal Agency, within the limitations of Federal authority and policy, will provide wildland fire protection at a level which is most nearly equivalent to the wildland fire protection that would be provided directly by the State on SRA of equal hazard, risk and value. Federal law regarding the obligating of Federal appropriations prohibits expenditures of wildland fire protection funds when there is no Federal interest in the lands. Fires

occurring on any SRA in the DPA of the Federal Agencies will virtually always be a threat to FRA. It is in the Federal interest to protect these lands when a threat occurs, therefore any assistance requested of the State, other than "Mutual Aid", will be "Assistance by Hire".

16. Protection of FRA

The State and Federal Agencies shall jointly develop and review the Operating Plan for the protection of FRA located within State DPAs. As identified in the Operating Plan, the State will provide wildland fire protection at a level, which is most nearly equivalent to the wildland fire protection that would be provided directly by the Federal Agencies on FRA of equal hazard, risk and value. State law regarding the obligating of State appropriations prohibits expenditures of these funds when there is no threat to SRA lands. Fires occurring on any FRA in the DPA of the State will virtually always be a threat to SRA. When such is the case, any assistance requested of the Federal Agencies, other than Mutual Aid, will be Assistance by Hire. The Federal Agencies retain all land management responsibilities except for wildland fire protection on FRA within the area where the State has Direct Protection Responsibility. This does not preclude the Federal Agencies from conducting fire prevention activities on these lands.

17. Protection of Local Responsibility Area (LRA)

Lands that are not SRA or FRA are considered "Local Responsibility Area" (LRA). Although LRAs are intermingled with and/or adjacent to SRA and FRA, the local government agencies protecting LRA are not parties to this agreement.

Situations can exist where LRA is threatened or burned by "wildfires" involving SRA and/or FRA. When this occurs, the jurisdictional and financial responsibility for fire protection of the LRA rests with the local government agency(ies). Consequently, the local government agency(ies) may become a legitimate and appropriate party to an interagency "cost share agreement." Procedures for initiating interagency cost share agreements involving LRA are detailed in paragraph 61, Local Government Agency Involvement in Cost Sharing.

The decision to seek reimbursement for costs associated with wildfires involving LRA is an agency policy issue and will be addressed on a case-by-case basis.

FIRE PROTECTION RESPONSIBILITIES

18. Protecting Agency

For the purpose of this agreement, the parties hereto shall be distinguished as follows: The agency responsible for the suppression of a fire because of its location shall be called the "protecting agency". Agencies not possessing such responsibility for fire suppression shall be called the "supporting agencies."

19. Fire Protection Fiscal Responsibilities

All costs incurred to meet the protection responsibility within each agency's DPA will be the responsibility of that protecting agency. This fiscal responsibility includes special management considerations as identified in the Operating Plan.

20. Changes in Fire Protection

When changes in the fire protection organization (i.e., a permanent or long term relocation of personnel and equipment) which will directly affect the protection level assigned to lands protected by one agency for another are anticipated, the affected agencies will be notified.

Any response to a projected reduction of resources having statewide or regional impact will be coordinated by the Director, the State Director, the Regional Director and the Regional Forester to mitigate impacts.

21. Attack Responsibilities and Fire Notification

Unless otherwise provided in the Operating Plan, each agency shall take prompt action to suppress all wildfires on, or threatening lands in its DPA. The Federal Agencies will notify State of fires burning on or threatening SRA under Federal Agency direct protection in a timely manner. State will notify Federal Agencies of fires burning on or threatening FRA under State direct protection in a timely manner.

22. Closest Forces

The State and the Federal Agencies agree to adopt the "Closest Forces Concept" for "initial attack." This philosophy dictates that the closest "available" appropriate resources regardless of ownership shall be utilized initially. The emphasis to get the closest appropriate resources to respond to "initial attack fires" is in the best interest of all agencies. This concept should be used for planning without regard to direct protection responsibility. This philosophy of closest forces will also be applied to ongoing incidents whenever there is a critical and immediate need for the protection of life and property.

Beyond initial attack, the closest forces concept is modified and the protecting agency will apply the philosophy of the "Most Appropriate Resource" to aid in the suppression of a wildfire.

23. Integrated Fire Protection Resource Use

Frequently, life, property and resource value threats mandate aggressive fire suppression resource application both in initial attack and in large fire operations. The State and Federal Agencies jointly acknowledge the necessity of mobilizing a suppression force that is capable of meeting incident objectives. Specifically, the agencies agree:

1. An integrated fire protection system, involving federal, state and local government resources, is the most effective method of delivering fire protection where life, property and high resource values are at risk.
2. A fully integrated initial attack force of suppression resources, including local government resources, is advantageous because it allows Incident Commanders to assign appropriate resources to objectives that complement their design. The agencies agree to aggressively pursue integrated resource initial attack plans where appropriate.
3. If incident priorities mandate that suppression resources are assigned to tactical operations that are different from their design and purpose, the Incident Commanders will adjust incident assignments as soon as it is reasonable and priorities allows. Further, the Incident Commanders will recognize the needs for specialized equipment in their resource orders.

24. Appropriate Suppression Action Policies

The State and Federal Agencies agree to adopt “appropriate suppression action” policies. Except where modified by the terms of this agreement as negotiated and specified in the Operating Plan or the Wildland Fire Situation Analysis (WFSA), all fire suppression activity, including “repair of suppression activity damage”, will be consistent with protecting agency policy.

The Special Management Considerations section of each Operating Plan will establish procedures and criteria for agencies to communicate land management considerations to Incident Commanders.

Any restrictions to normal firefighting tactical techniques, such as use of heavy mechanized equipment in “special management areas” (e.g. wilderness areas, wild and scenic rivers, roadless areas, and archeological sites) will be delineated on “protection unit” maps or otherwise identified in Operating Plans.

Procedures for the protection of special management areas will be acknowledged and included in Operating Plans. The Incident Commander will include these special conditions in the incident planning process.

25. Threat and Risk

Each agency assumes a responsibility and role in suppressing fires within their DPA. In some cases suppression actions and associated costs are driven by opportunity and perceived threat to exposed resources, or life and property values. Perceived threat and risk to unburned areas can require more intensive efforts and higher costs in one agency's responsibility area. When a fire is perceived to threaten or threatens the jurisdiction of another agency, the threat and risk can be considered in determining the share of costs actually expended.

26. Wildland Fire Situation Analysis (WFSA)

Federal Agency policy requires that a WFSA be completed for all fires on or threatening FRA that escape initial suppression action. The procedure requires the Federal Agency to participate in developing incident objectives for the suppression action. When fires occur on State-protected FRA, the responsible Federal Agency will actively involve the State in this process. Operating Plans will contain procedures for completion and approval of the WFSA. Final responsibility for strategy and tactical implementation within the selected alternatives in the WFSA shall rest with the Incident Commander.

Similarly, for fires occurring on Federally-protected SRA which may require a WFSA, the STATE shall participate in the WFSA process.

27. Suppression of Fires on DPA of Another Agency

Any participating agency may, upon its own initiative and with appropriate notification and coordination, attack wildland fires on lands that are under the direct protection of another agency. None of the parties to this agreement shall perform any fire suppression action that is contrary to limitations found in the appropriate Operating Plan. The protecting agency may assume command of all fire suppression action when a qualified Incident Commander of that agency arrives at the fire.

28. Boundary Fires-Between State and Federal Agencies

A fire burning on, or directly adjacent to, the DPA Boundary will be the initial attack responsibility of the protecting agencies on either side of the boundary. Each agency will bear the cost of its initial attack forces on a "boundary fire". Unless it is determined that the fire is confined to the DPA of either the State or the Federal Agencies, a unified command organization will be implemented. For unified command, the Incident Commanders of the involved agencies shall mutually agree upon fire suppression objectives, strategies, commitment of agency suppression resources and establishment of the Unified Ordering Point (UOP), (Reference Exhibit D, Unified Ordering Point).

If it is determined that the fire is confined to the DPA of either the State, the Bureau, the Park Service, or the Forest Service, the protecting agency will designate an Incident Commander. If necessary, the protecting agency may request the supporting agency to assume command of the fire.

29. Boundary Fires - "Contract Counties"

State law provides that a county may, with the concurrence of the State, elect to assume responsibility for the fire protection of SRA and that the State may enter into a contract with said county for necessary protection. The State has entered into such a contract with the counties of Marin, Kern, Santa Barbara, Ventura, Los Angeles, and Orange that are hereinafter referred to as contract counties. These contracts are for the protection of SRA only, as State law does not provide for the State to contract with these counties for the protection of FRA. The protection of any FRA, LRA and improvements rests with the appropriate Federal Agency(ies) and/or local agency fire department(s) respectively.

A contract county is responsible for the command of all firefighting forces on fires in SRA within the county DPA. The contract county will make an aggressive initial attack on all fires and make a reasonable and substantial commitment of county or local mutual aid forces before requesting State assistance. If it is determined that State paid suppression assistance is required, the State will assign an Agency Representative or Agency Administrator. The Agency Representative or Agency Administrator will determine and authorize the State's fiscal responsibility. In the absence of an Agency Representative or Agency Administrator, the appropriate State Region Command Center (RCC) will determine and authorize the State's fiscal responsibility. The responsibility and authority for any expenditure of State emergency funds must rest with a State forest officer, typically the assigned Agency Representative or Agency Administrator.

30. Contract County Resource Costs

The state may pay for certain contract county resources used on SRA fires within the county provided their use is approved by the State. Such payments are in addition to the regular contract amount. Conversely, there are certain contract county resources that the State will not pay for when used on an SRA fire within the county. Because of the potential for State financial involvement on SRA fires in the contract counties, significant boundary fires involving the Federal Agencies will become cost share fires between the State, the Federal Agencies and possibly the contract county.

Contract County resources are eligible for reimbursement by Federal Agencies under local agreements when ordered by a Federal Agency to work initially in the Federal DPA, outside of established mutual-aid period. In cost share situations, these costs will be accepted in the cost pool.

31. Protection Priorities

The State and Federal Agencies agree that they mutually share technical responsibilities for all values at risk from wildfire within their respective DPAs. Further, each agency agrees that incident management objectives will provide for firefighter safety first and recognize the following priorities:

1. Threat to human life.
2. Threat to property (e.g., structures, improvements, and communities) and natural/cultural resources.

To the extent that incident objectives allow, the State and Federal Agencies agree to honor and aggressively pursue remedies to emergency fire situations that are consistent with what the other agencies would have done had they been present. Specifically, the State and Federal Agencies acknowledge the necessity of demonstrating aggressive diligence in protecting structures and improvements from wildfire and protecting wildland and watershed from structure and improvement fires.

32. Payment of Structure Protection

For wildfires within a State or Federal Agency's DPA, that agency will bear financial responsibility for all costs resulting from actions taken by that agency's Incident Commanders in suppression efforts and in minimizing damages to exposed life, property and natural resource values. An exception to this would be costs that are reasonably incurred by the local agency in its jurisdiction while providing structural fire protection.

For wildfires involving multiple DPA's, those agencies will bear the financial responsibility for costs resulting from the actions taken by the Incident Management, as documented in the signed cost share agreement.

In situations when local government fire protection agencies order additional resources and initiate additional actions beyond the level deemed necessary by the Unified Command, the local agency is responsible for the costs. The additional resources would be obtained through either a local agreement or the "Master Mutual Aid Agreement".

Structure Protection Payment Guidelines and scenarios are identified as Exhibit G, Structure Protection Guidelines, of this agreement.

33. Non-Wildfire and Other Emergency Responses

This agreement is limited to wildland fire protection. However, the State and Federal Agencies may, where laws and regulations allow, assist one another on a reimbursable basis

in any non-wildfire emergency response as long as the requested resources are available and all other provisions of the agreement are met.

34. General Fire Prevention Policies

All fire prevention actions, including “Fire Safe Planning”, conducted by the protecting agency in its DPA on lands of the other agencies will be consistent with the protecting agency's general fire prevention activities and the terms of this agreement. Fire prevention program planning will be coordinated between agencies to determine appropriate levels of service as identified in the Operating Plan.

The State and the Federal Agencies, through interagency efforts, where possible, shall develop goals, objectives and expectations for interagency fire prevention activities. Specific fire prevention activities will be developed by local interagency fire prevention committees and identified in the Operating Plan consistent with Exhibit F, Fire Prevention, of this agreement.

35. Prescribed Fire Management

Specifics for the cooperative use of “prescribed fire” are covered in the Interagency Agreement for Cooperative Use of Prescribed Fire.

In the event a wildfire results from prescribed burning operations of CDF or a Federal Agency, as distinguished from joint prescribed burning operations, sole responsibility and accountability for the costs of suppression rest with that agency.

36. “Wildland Fire Use”

In the event a wildfire results from Wildland Fire Use operations of CDF or a Federal Agency, sole responsibility and accountability for the costs of suppression rest with that agency. The most appropriate resources should be assigned to Wildland Fire Use.

JOINT USE OF RESOURCES

37. Two Categories of Suppression Resources

Joint use of fire suppression resources is divided into two categories, herein called Mutual Aid and Assistance by Hire.

38. Mutual Aid

For the purposes of this section, Mutual Aid is that automatic initial attack response by suppression resources and specified in the Operating Plan for specific pre-planned initial attack response areas. The Operating Plan will identify those initial attack resources that will

be provided at no cost to the protecting agency as mutual aid. Mutual Aid will be limited to 24 hours from the time of initial report. Mutual Aid resources should be released as soon as possible. In no case shall they be held beyond the 24-hour mutual aid period without consent of the supporting agency. All assistance beyond these Mutual Aid periods will be Assistance by Hire, and will be billed retroactively for the full period from the time of initial dispatch.

Aircraft (fixed and rotary-winged, including pilot(s)) shall always be Assistance by Hire.

39. Assistance by Hire

Assistance by Hire is the provision of fire suppression resources, by one agency to another, on a full reimbursement basis. All requests to hire fire protection assistance must be clear and precise and shall be processed and recorded through the dispatching systems of the participating agencies. Requests not processed in this manner will not be reimbursable. Personnel, equipment, supplies or services provided by a supporting agency and essential to filling the resource order, which are necessary and reasonable, shall be considered as reimbursable as Assistance by Hire. The State may provide out-of-state assistance to the Federal Agencies when requested. Such assistance will be assistance-by-hire unless otherwise specified as mutual aid in Operating Plans pursuant to this agreement.

Except for Mutual Aid, all requests for fire suppression assistance in an agency's DPA shall be Assistance by Hire. Any other resources provided by a supporting agency and not specifically ordered by the protecting agency, shall be considered a voluntary contribution.

40. Initial Attack

The State and Federal Agencies agree to aggressively pursue initial attack plans that utilize closest fire suppression resources. Each protection unit will identify pre-planned initial attack response areas within its' DPA.

41. Move-up and Cover

"Move-up and Cover" can be either Mutual Aid or Assistance by Hire as specified in the Operating Plan. Move-up and Cover is limited to moving supporting agency engine companies into protecting agency facilities that have been temporarily vacated because of emergency activity. The protecting agency may provide vehicle fuel, minor maintenance, and lodging at no cost to the supporting agency. Resources on Mutual Aid Move-up and Cover will remain Mutual Aid until released or exceed 24 hours.

42. Dispatching Services

Routine dispatching services by the supporting agency will be at no cost to the protecting agency. If additional dispatching services are requested through a resource order, those services will be Assistance by Hire.

43. Organized Emergency Crews

Organized Emergency Crews (e.g., On Call Crews and Contract Crews), usually consisting of 20 persons that are organized, trained, and supervised by the Federal Agencies, are available for State use. Organized Emergency Crews currently under Federal Agency hire can be sent to State fires without changing payroll systems. Salary and transportation costs will be reimbursed as Assistance by Hire. Federal Agency Crew Technical Specialists accompanying an Organized Emergency Crew will be reimbursed as Assistance by Hire.

44. Motorized Ground Equipment

Use rates for all State and Federal Agency-owned motorized ground equipment (including operators) provided as Assistance by Hire shall be paid at the rate established by each agency for its equipment. Rates for motorized equipment will include motor fuels and lubricant costs. Charges for motor fuels and lubricant costs supplied by the protecting agency will be billed separately.

The State and Federal Agencies agree to jointly use Emergency Equipment Rental Agreements (EERAs) and Interagency EERA rates for privately owned equipment hired for fires. Instruction for administering these agreements has been provided in the California Interagency Emergency Equipment Rental Rate Packages submitted to each agency's operational and administrative units.

45. Aircraft

Interagency use of, and billing for, aircraft will be in accordance with procedures mutually established by the State Director, the Regional Director, the Regional Forester and the Director. Interagency aircraft use guidelines are attached hereto as Exhibit C. Aircraft contracts require their contractors to bill the "contracting agency" for all payments due. State and Federal Agencies' contract aircraft used by other parties herein under the Assistance by Hire terms of this agreement will be paid by the contracting agency. The contracting agency will, in turn, bill the using agency for all Assistance by Hire aircraft use. The "administrative charge", used for all Assistance by Hire billings, will be added to all charges for use of contract aircraft.

The State and Federal Agencies agree to bill each other only for like aircraft costs. These costs are divided into two categories: Flight and Availability. The Operating Plan for

Cooperative Incident Billing Procedures contains additional definitions and explanations on aircraft billings.

46. Personnel

With the exception of personnel included in Mutual Aid, each agency shall submit a bill which shall include salary, overtime, employee benefit cost, travel, and subsistence (including lodging) related directly to the fire, for all personnel ordered by the protecting agency.

47. California Interagency Incident Management Teams

Management of wildland fires in California has become more complex for all agencies and repeatedly involves multiple agencies when fires exceed initial attack efforts. The State and Federal Agencies also have found it more difficult to staff agency Incident Management Teams. The structure of Incident Management Teams within California will be jointly reviewed annually by the State and Federal Agencies.

48. Duration of Assignments

Consideration must be given to the health and safety of personnel when assigned to fires of long duration. It is agreed that duration of assignments are dictated by each agency's policy. Extension of assignments beyond the agency policy may be requested. It is the responsibility of the protecting agency to request relief personnel in advance of the supporting agency's policy time limits. The protecting agency is further responsible for the transportation costs of moving personnel to the fire and returning those relieved personnel back to their home stations. In all cases, the State and Federal Agencies agree that their Incident Commanders will release suppression resources to their primary mission responsibilities as soon as priorities allow.

49. Obtaining and Replacing Fire Supplies

Either the State or Federal Agencies may elect to procure fire equipment and supplies from each other for fire suppression or fire replacement. Orders for fire suppression equipment, including fire hose, tools, sleeping bags, headlamps, rations and other equipment will be processed through established channels. Replacement of agency-owned expendable tools and supplies lost, damaged or expended by the supporting agency may be reimbursed except as provided in paragraph 68, Waiver of Claims.

50. California National Interagency Caches

The California National Interagency Caches are part of the national system that supports wildland fires as a primary mission but will support non-fire incidents when it does not adversely affect its primary function. It is essential for cache items to be promptly returned in accordance with loss/tolerance limits so the cache is available to supply future incidents.

The State agrees to comply with established National Fire Cache procedures as outlined in the "California Mobilization Guide" and National Fire Cache Operating Plan.

51. Facilities, Equipment and Support

It is mutually agreed that when beneficial for the protection of FRA and/or SRA, and in conformance with existing laws and regulations, the State and the Federal Agencies may procure, loan, lease, share or exchange facilities, equipment and support services. This may include, but is not limited to, such things as administrative facilities, dispatch centers, fire stations, air attack bases, lookouts, warehouses, vehicles, fire equipment, remote automatic weather stations, lightning "detection" equipment and communications equipment. Any operational costs required for such use may be shared and reimbursable by the using agency. Any shared cost or reimbursements will be governed in accordance with existing policy of each agency and documented in a "Facility Operating Plan". Whenever it has been agreed between a Federal Agency and the State that mutual benefit exists, any fees for such use, as might be found in Special Use permits or other similar documents, may be waived.

52. Interagency Use of Communications/Information Systems

The State and Federal Agencies may mutually agree to share components of their communications and information management systems such as: radio frequencies, computer networks, automated dispatching and resource ordering systems, data transmission lines and communications sites. Further, the agencies agree to work cooperatively in the further development, deployment and utilization of such systems and facilities. The Director and the Regional Forester, Regional Director or State Director will approve such agreements. Operating Plans detail any restrictions or special requirements of this sharing.

53. Federal Agencies Weather Data Processing System

The State and Federal Agencies agree to collaborate in providing fire weather services. The State will be permitted use of the Federal Agencies' weather data processing system. Use of the system will be from computer terminals in Sacramento and various locations owned by the State. When the State uses the system, the identifying account numbers assigned by the Federal Agencies to the State will be used.

54. Remote Automatic Weather Stations (RAWS)

The State and the Federal Agencies will cooperate in the gathering, processing and use of fire weather data, including the purchase of compatible sensing systems and joint use of computer software. The State and the Federal Agencies will jointly evaluate any new California locations where installation of RAWS is contemplated to prevent site overlap.

55. Cooperative Training

The State and the Federal Agencies will cooperate in the development of interagency courses and assist in conducting National Fire Fighter Joint Apprenticeship (NatJAC) training and other multi-agency training sessions. All agencies will cooperate to make maximum use of existing personnel, equipment and facilities for training purposes through the development of an annual "Training Operating Plan". Any payment will be made in accordance with existing policy and regulations.

56. Post-Incident Action Analysis

To benefit from lessons learned on fire incidents falling under the terms of this agreement, the State and Federal Agencies may from time to time conduct a post-incident action analysis. In all cases, these critiques or reviews will be conducted jointly by the State and the affected Federal Agency(ies) and will follow discussions between the Incident Commander and the appropriate Line Officer.

GENERAL PROVISIONS

57. Appropriate Fund Limitation

Nothing herein shall be interpreted as obligating the Federal Agencies or the State to expend funds or as involving the United States or the State of California in any contract or other obligation for the future payment of money in excess of appropriations authorized by law and administratively allocated for the work contemplated in this agreement.

58. Procurement Authority

Procurement costs incurred by one agency in support of another agency, which are reasonable and prudent, may be charged back to the protecting agency. Whenever a State or Federal Agency is managing an incident (including an incident within another agency's DPA), those agencies must comply with the procurement regulations of their respective agencies. In such situations, the protecting agency should provide appropriate staff to represent that agency's fiscal concerns and procurement and contracting requirements.

59. Accounting for Assistance by Hire Costs

The State and the Federal Agencies will document all expenditures incurred for providing Assistance by Hire services under the terms of this agreement. Expenditures include both direct costs and indirect or administrative costs. The administrative charge, used for all Assistance by Hire billings, will be applied to all direct costs. The State and the Federal Agencies shall use a comparable method to determine the rate for such administrative charges. All costs will be calculated using established agency procedures.

60. Cost Sharing

INCIDENTS -A cost share agreement will be prepared when there is: (1) a multi-jurisdictional incident or, (2) an incident which threatens or burns across DPAs of the State and Federal Agencies and the Mutual Aid period has been exceeded. The State and the Federal Agencies have agreed upon methods for determining cost share procedures. These methods are described in the California Interagency Administrative Guide.

INCIDENT SUPPORT AND COORDINATION OPERATIONS – The State and Federal Agencies agree to jointly share the cost of incident support and coordination operations.

1. Separate cost share agreements will be developed for incident support and coordination operations. Redding and Riverside OCCs require special consideration (refer to #5 below).
2. Typically, cost share agreements for incident support and coordination operations will include the costs generated by management groups and resources not ordered for a specific fire incident. The responsibility for the development of such an agreement will reside with the managers of the support or coordination operation that has been mobilized.
3. Actual costs should be accounted for separately by using an appropriate order number for each agency and support facility and not intermingled with specific fire incident costs. Cost shares will be developed for each unique support operation. As the methodology may vary with each location and situation, it will be documented in the resulting cost share agreement.
4. These incident support and coordination operations need to be staffed to redeem their financial responsibilities, including cost share agreements. The management of these operations should include a Finance Section Chief and any needed administrative support positions.
5. Absent a separate negotiated cost share agreement by the State and Federal OCC Coordinators, the costs involved with the Operation Coordination Centers at Redding and Riverside will be the responsibility of the ordering agency.
6. The guidelines for developing for Incident Support and Coordination Operations Cost Shares are described in the California Interagency Administrative Guide.

61. Local Government Agency Involvement in Cost Sharing

The State and Federal Agencies recognize that cost share agreements may contain cost shares assigned to local government agencies that are charged with the protection of LRA. When developing cost share agreements, LRA shares will be identified even though those shares

may be absorbed by the State or Federal Agencies. In the event a responsible local government agency is unable or unwilling to become a party to a cost share agreement, the LRA cost shares will be assigned to the State and/or Federal Agencies using the following logic:

1. If the LRA that was burned, or threatened, is entirely related to one agency's DPA, then that agency will assume the responsibility for negotiations for recovery of LRA costs.
2. If the LRA that was burned, or threatened, is related to the DPA of the State and one or more of the Federal Agencies, then the LRA cost share will be apportioned between the respective agencies based on an agreement between the Incident Commanders, and the negotiations for recovery of LRA costs will be assumed by the involved agencies.
3. The decision to seek reimbursement for costs associated with protection of LRA is a policy issue for each of the parties to this agreement that will be addressed on an individual case basis. The agency with the greatest percentage share will typically lead the reimbursement effort.

62. "Cost Apportionment" and "Cost Share Settlements"

For incidents which involve multi-operational periods and/or high cost incidents, as determined by Incident Commanders, for which cost sharing is appropriate, Incident Commanders will use cost apportionment methods in developing incident cost share agreements. Cost apportionment methods are described in the California Interagency Administrative Guide. State and Federal Agency Cost Apportionment Technical Specialists (CATS) will be trained and available to assist an incident command in developing the cost share documentation and agreements for appropriate incidents. These technical specialists will be available through normal ordering and dispatching channels.

Cost share settlement meetings will be conducted in accordance with the Operating Plan for Cooperative Incident Billings Procedures.

63. Billing Procedures

For any incidents or other actions where costs are incurred pursuant to the terms of this agreement, the agencies will comply with the processes and procedures established in the Operating Plan for Cooperative Incident Billing Procedures.

64. Employment Policy

It is agreed that employees of the parties to this agreement shall at all times be subject only to the laws, regulations, rules, and Memorandum of Understanding (MOU) governing their

employment, regardless of agency, and shall not be entitled to compensation or other benefits or terms and conditions of employment.

65. Mutual Sharing of Information

The State and the Federal Agencies will furnish to each other, or otherwise make available upon request, such maps, documents, instructions, records, and reports, including, but not limited to, fire reports, employment records, and law enforcement reports as either party considers necessary in connection with the agreement, in accordance with applicable State and Federal rules and regulations.

66. Suppression and Damage Collection

The State and Federal Agencies reserve the right to pursue independent and separate courses of litigation and cost collection for suppression and damages on those fires that affect both State and Federal interests. Any costs recovered as a result of independent litigation will not be subject to apportionment with other affected agencies. Whenever collections that result from joint legal action have the effect of reducing the net expenditures of the State or the Federal Agencies to accomplish services provided for in this agreement, then such collections may be reported and shared proportionately, after deducting the cost of collection, with the affected agencies.

Refer to the Operating Plan for Cooperative Incident Billing Procedures for information on Cost Share Settlements Involving Civil Cost Recovery or Court Ordered Restitution.

67. Accident Investigations

Whenever an accident occurs involving the equipment or personnel of a supporting agency, the protecting agency shall take immediate steps to notify the supporting agency that an accident has occurred. As soon as practical, the protecting agency shall conduct an investigation of the accident. A team made up of appropriate representatives from all affected agencies shall conduct the investigation. See Exhibit C, Interagency Aircraft Utilization Guidelines, for aircraft accidents.

Investigation cost for personnel will be agency specific and will be borne by the sending agency. Other accident or incident investigation costs are the fiscal responsibility of the agency(ies) that has jurisdiction and/or investigative responsibility.

The sharing of information between agencies on accident investigations and their findings and probable causes is a valuable tool for safety and must be encouraged.

68. Waiver of Claims

The State and the Federal Agencies hereby waive all claims between and against each other, arising in the performance of this agreement, for compensation for loss or damage to each other's property, and personal injury, including death, of employees, agents and contractors.

69. Officials Not to Benefit

No member of, or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this agreement or to any benefit to arise there from, unless it is made with a corporation for its general benefit.

70. Mutual Interest Projects

The State and the Federal Agencies may jointly conduct appropriate mutual interest projects to maintain or improve the fire protection capability of these agencies. Such projects will be properly documented and will set forth the objective of each undertaking and the role each agency will play in accomplishing that objective. Anticipated cost and the amount of each agency's share of the cost will be shown and itemized. An agreement should be executed whenever such a mutual undertaking is of a localized nature, involves an exchange of funds, and/or involves a considerable exchange of services.

Such agreements shall not be in conflict with the terms of this agreement.

71. Previous Agreement Canceled

This agreement supersedes and cancels the Cooperative Fire Protection Agreement, CDF #7CA61373, entered into on January 1, 1997, between the Forest Service, the Bureau, the Park Service, and the State.

72. Duration of Agreement

The term of this agreement shall commence on the last signatory date below, and shall continue through December 31, 2006, unless sooner terminated upon 60 days prior written notice between the State, the Bureau, the Park Service, and the Forest Service.

73. Amendments Procedure

This agreement may only be amended by written mutual consent of the parties hereto.

74. Examination and Audit

Federal Agencies and the State shall be subject to examination and audit for three years after final payment under the terms of this agreement. Examination and audit shall be confined to those matters connected with the performance of this agreement including, but not limited to, the cost of administration.

75. Nondiscrimination

The State and Federal Agencies shall comply with all Federal statutes relating to nondiscrimination. These include, but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d through 2000-6); (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. 1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794) which prohibits discrimination on the basis of disabilities and provides for reasonable accommodation in hiring of persons with disabilities; (d) the Older American Act of 1965 as amended (42 U.S.C. 3056 and 6101 et seq.); and (e) USDA 9 AR, Title VI Implementation Regulations.

IN WITNESS WHEREOF, the parties hereto have executed this agreement.

STATE OF CALIFORNIA
DEPARTMENT OF FORESTRY
AND FIRE PROTECTION

REGIONAL FORESTER
USDA FOREST SERVICE
REGION FOUR

By: [Signature]
DIRECTOR

Date: 10/01/01

By: [Signature]
REGIONAL FORESTER

Date: 2/20/02

STATE DIRECTOR
USDI BUREAU OF LAND MANAGEMENT
CALIFORNIA

REGIONAL FORESTER
USDA FOREST SERVICE
REGION FIVE

By: [Signature]
STATE DIRECTOR

Date: 2/1/02

By: [Signature]
REGIONAL FORESTER

Date: 2/28/02

REGIONAL DIRECTOR
USDI NATIONAL PARK SERVICE
PACIFIC WEST REGION

REGIONAL FORESTER
USDA FOREST SERVICE
REGION SIX

By: [Signature]
REGIONAL DIRECTOR, John J. Reynolds

Date: 1/28/02

By: [Signature]
REGIONAL FORESTER

Date: APR 17 2002

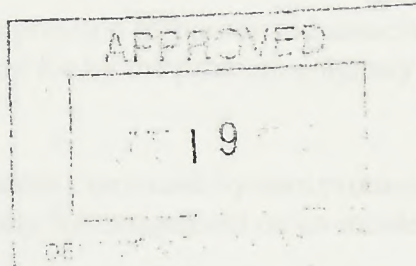
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NPS #H8000020001
FS #01-FI-11052012-212
BLM #BAI021002

STATE DIRECTOR
USDI BUREAU OF LAND MANAGEMENT
NEVADA

By: *Robert - Alley*
STATE DIRECTOR

Date: 2-22-02

STATE OF CALIFORNIA
DEPARTMENT OF GENERAL SERVICES



Debraon Dravin

RECEIVED
NATIONAL BUREAU OF INVESTIGATION
FEDERAL BUREAU OF INVESTIGATION
WASHINGTON, D.C. 20535

STATE DIRECTOR
UNITED BUREAU OF INVESTIGATION
NEVADA

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STATE OF CALIFORNIA
DEPARTMENT OF FORESTRY

REGIONAL FORESTER
NATIONAL PARK SERVICE
INVESTIGATIVE SECTION

REGIONAL FORESTER
NATIONAL PARK SERVICE
INVESTIGATIVE SECTION

Special Agent in Charge, J. J. Reynolds

Special Agent in Charge, J. J. Reynolds

Date: APR 17 1962

RECEIVED (1962)

COOPERATIVE FIRE PROTECTION AGREEMENT

EXHIBIT A

GLOSSARY

ADMINISTRATIVE CHARGE: That pre-established percentage charge that will be applied by the billing agency.

AGENCY AIRCRAFT: Any firefighting fixed or rotary-winged aircraft owned or contracted exclusively to the State or Federal Agencies.

AGENCY REPRESENTATIVE: A supporting agency employee with full authority to make decisions on all matters affecting that agency's participation at the incident.

APPROPRIATE SUPPRESSION ACTION: Fire suppression action consistent with protecting agency fire suppression policy, except where modified by Operating Plans or WFSAs.

ASSISTANCE BY HIRE: Fire suppression resources and associated support resources needed to fill the incident order that are to be paid for by the protecting agency. Reimbursement is on an actual cost basis.

AVAILABLE: Following the Incident Command System protocols, the status of a fire fighting resource that indicates its availability for assignment on an incident.

BOUNDARY FIRE: A fire burning on or directly adjacent to the Direct Protection Boundary between the State and the Federal Agencies.

CALIFORNIA MOBILIZATION GUIDE: Interagency procedures for requesting, documenting and sending resources to incidents within the State of California.

CALIFORNIA WILDFIRE COORDINATING GROUP (CWCG): Executive level interagency committee made up of representatives from the Forest Service, California Department of Forestry and Fire Protection, Bureau of Land Management, National Park Service, USDI, Bureau of Indian Affairs, USDI, Fish and Wildlife Service, Local Government and California Office of Emergency Services.

CALL-WHEN-NEEDED (CWN): Generally refers to aircraft certified by the State or Federal Agencies for intermittent use.

CLOSEST FORCES CONCEPT: The philosophy of committing the closest available appropriate resources, regardless of ownership, as described in the Operating Plan, to a wildfire for initial attack or for critical need.

CONTRACT COUNTY: Six county fire departments within the State of California that provide initial attack fire suppression to the State responsibility Area within each County through agreements with the California Department of Forestry and Fire Protection. The counties are Kern, Los Angeles, Marin, Orange, Santa Barbara and Ventura.

CONTRACTING AGENCY: The agency that holds a contract for specific services or commodities with a vendor.

COST APPORTIONMENT: One of four methods used to determine cost share responsibility. This method is based on the suppression effort of ground and air resources.

COST OVERSIGHT GROUP (COG): Executive level interagency committee comprised of representatives from the Forest Service, California Department of Forestry and Fire Protection, Bureau of Land Management and National Park Service.

COST POOL: Accumulated costs paid by an agency for an incident. The pool will include suppression, support and administrative costs incurred by that agency for that incident. This term is used to describe the total costs brought by an agency to a Cost Share Settlement meeting.

COST SHARE AGREEMENT: An interagency agreement describing the conditions and/or percentage of State, Federal and possibly Local Agency financial responsibility for costs incurred as a result of jointly approved operations pursuant to the terms of this agreement.

COST SHARE SETTLEMENT: Process in which agencies involved in a Cost-Shared Incident or activity bring their respective sharable costs for an incident or activity to a meeting in which those costs are validated and then redistributed according to the Cost Share Agreement.

DETECTION: The act or system of discovering and locating a fire.

DIRECT PROTECTION AREA (DPA): That area which, by law or pursuant to the terms of this agreement, is provided wildland fire protection by the State or by the Federal Agencies. DPAs may include a mixture of state and federal responsibility areas.

DIRECT PROTECTION AREA MAPS: Official maps which identify areas of direct wildland fire protection for each agency.

EQUIVALENT: Equivalent fire protection is that which may be reasonably compared, using mutually agreed to measures such as staffing, organization, performance and available resources.

FACILITY OPERATING PLAN: A document developed in accordance with the terms of this agreement, at the appropriate State and Federal Agency administrative level for the sharing of facilities, equipment, and support activities detailing the responsibilities and any financial obligations of the State and Federal Agency(ies) involved.

FEDERAL RESPONSIBILITY AREA (FRA): Those lands, administered or controlled by the Federal Government, for which the Federal Agencies have administrative and protection responsibility.

FIELD REVIEW: A review of fire protection designed to verify that the boundaries and suppression forces of any signatory agency conform to the intent of this Cooperative Fire Protection Agreement.

FIRE HELICOPTER: A rotary wing aircraft provided by the State or a Federal Agency for planned availability and initial attack fire response.

FIRE PREVENTION: Activities directed at reducing the number of fires that start, including public education, law enforcement, dissemination of information and the reduction of hazards through engineering methods.

FIRE SAFE PLANNING: Those activities relating to the implementation and enforcement of Public Resources Code Section 4290.

HANDCREW: A wildland fire suppression crew consisting of approximately 15 to 20 persons.

HELITACK: A fire fighting module consisting of a "fire helicopter", helitender, and fire fighting crew. The number of personnel in the crew may vary.

INCIDENT: An occurrence or event, either human-caused or natural phenomena, that requires action by emergency service personnel to prevent or minimize loss of life or damage to property and/or natural resources.

INITIAL ATTACK: Resources initially committed to an incident.

INITIAL ATTACK FIRE: A fire that is generally contained by the first dispatched fire suppression resources without significant augmentation or reinforcement.

LEVEL OF FIRE PROTECTION: Identifies the degree of protection to be provided with recognition that lands of equal hazard, risk, and value under similar conditions shall receive a comparable level of protection.

LOCAL AGREEMENT: An agreement between adjoining or closely aligned agencies/jurisdictions that identifies the terms and conditions for providing assistance to each other. These agreements can take many forms, including Mutual Aid, Automatic Aid, Joint Powers, etc.

LOCAL GOVERNMENT FIRE PROTECTION: Includes those political subdivisions (Fire Districts, Community Services Districts, County Service Areas, etc.) of the State of California with primary responsibility for life and property fire protection. Where these entities exist within designated SRA and FRA, the primary responsibility for wildland fire protection rests with the State or Federal agency that has the DPA responsibility, resulting in a dual fire protection situation. However, where the

lands in the State are designated as Local Responsibility Area (LRA), as within cities and other classified unincorporated areas, all fire protection responsibility rests with the established local government entity.

LOCAL RESPONSIBILITY AREA (LRA): Lands within the exterior boundaries of any city, or lands not classified as FRA or SRA. Such lands would include agricultural and other areas void of watershed, forest, brush or rangeland values.

MASTER MUTUAL AID AGREEMENT: (Also known as the California Disaster and Civil Defense Master Mutual Aid Agreement). This is an agreement, without expectation of reimbursement, between the state and its political subdivisions (cities, counties, districts, etc.) for the exchange of resources during emergency situations. Effective mobilization of fire protection resources under this agreement is accomplished through the California Fire Services and Rescue Emergency Mutual Aid System Mutual Aid Plan under the direction of the Governor's Office of Emergency Services (OES).

MOST APPROPRIATE RESOURCE(S): The selection of suitable resources used by the agency managing an extended attack or major wildfire in its Direct Protection Area.

MOVE-UP AND COVER: Identifies a relocation of fire suppression resources from their established location to a temporary location to provide fire protection coverage for an initial attack response area.

MUTUAL AID: Automatic initial attack response by suppression resources (excluding aircraft and pilot(s)) as specified in the Operating Plan for specific pre-planned initial attack response areas and provided at no cost to the protecting agency for the first 24 hours from the time of initial report. Mutual Aid is limited to those Initial Attack resources or move-up and cover assignments that have been determined to be appropriate in the annual Operating Plans. Aircraft (fixed and rotary-winged, including pilot(s)) shall always be Assistance by Hire.

OFFICIAL MAP(S): Map(s) printed off of the CDF Headquarters Fire Protection Section database.

OPERATING PLAN: A plan developed at the Forest Supervisor, Park Superintendent, or Bureau Line Officer and State Unit Chief levels for implementing the Cooperative Fire Protection Agreement in their respective areas of responsibility.

OPERATING PLAN FOR COOPERATIVE INCIDENT BILLING PROCEDURES: A document developed in accordance with the terms of this agreement that defines each agency's billing and settlement procedures.

PRESCRIBED FIRE: The planned use of fire on wildlands to accomplish specific objectives including reducing fire hazard, providing flood protection, enhancing wildlife and fisheries, or improving water yields and/or air quality.

PRE-SUPPRESSION: Activities in advance of fire occurrence to insure effective suppression action, includes training, planning, procuring and maintaining equipment, development of fire defense improvements and maintaining cooperative arrangements with other agencies.

PROTECTING AGENCY: The agency responsible for providing direct wildland fire protection to a given area pursuant to this agreement.

PROTECTION UNIT: Forest Service Protection Units shall mean National Forests, Bureau Protection Units shall mean Bureau of Land Management Field Offices, Park Service Protection Units shall mean National Parks, National Monuments, National Seashores, National Preserves, National Historic Sites and National Recreation Areas, and State Protection Units shall mean Units.

REPAIR OF SUPPRESSION ACTIVITY DAMAGE: Those activities undertaken by fire suppression forces during or immediately after the control of a wildfire to insure the prevention of erosion or to repair other damages resulting from fire suppression activities.

RESPONSIBILITY AREAS: See definitions for Local Responsibility Area (LRA), State Responsibility Area (SRA), and Federal Responsibility Area (FRA) elsewhere in glossary.

SPECIAL MANAGEMENT AREAS: Specific areas with management objectives that require special consideration and procedures, including areas that have been so designated legislatively or administratively because of their unique resource values.

STATE RESPONSIBILITY AREA (SRA): Lands exclusive of cities and FRA, regardless of ownership, classified by the State Board of Forestry as areas in which the primary financial responsibility for preventing and suppressing fires is that of the State. These are lands covered wholly or in part by timber, brush, undergrowth or grass, whether of commercial value or not, which protect the soil from erosion, retard runoff of water or accelerate percolation and lands used principally for range or forage purposes.

SUPPORTING AGENCY: An agency directly contributing suppression, rescue, support or service resources to the agency possessing direct fire protection responsibility for the area upon which an incident is located.

SUPPRESSION: All the work of confining and extinguishing a fire beginning with its discovery.

TRAINING OPERATING PLAN: A document developed in accordance with the terms of this agreement at the appropriate State and Federal Agency administrative level to address training issues including but not limited to: the sharing of training facilities, use of cadres, course scheduling, financial procedures, training standards.

UNCOMMITTED: Not assigned to an incident on an Order Number and Request Number.

UNIFIED COMMAND: The organizational structure implemented on multi-jurisdictional incidents. The Agency Incident Commanders will jointly determine incident objectives.

WILDFIRE: An unwanted fire burning uncontrolled on wildland.

WILDLAND: Lands covered wholly or in part by timber, brush, grass, grain, or other flammable vegetation.

WILDLAND FIRE PROTECTION: Those activities commonly referred to as detection, prevention, pre-suppression, suppression, and repair of suppression activity damage that cumulatively contribute to the management, control or elimination of wildfires.

WILDLAND FIRE USE: The use of wildland fire to accomplish land and resource management objectives is referred to as prescribed fire, the deliberate application of fire to wildlands to achieve specific resource management objectives. These fires may be ignited either by resource managers or by natural events such as lightning.

COOPERATIVE FIRE PROTECTION AGREEMENT

EXHIBIT B

OPERATING PLAN OUTLINE

The Operating Plan will be a local working document that is developed between the various Bureau Field Office(s), National Forest(s), National Park(s) and the appropriate State Unit(s), and shall be an attachment to the Cooperative Fire Protection Agreement. It shall be forwarded to the Director and the State Director, Regional Director, or Regional Forester by May 15, following approval by the designated State representative and the Bureau Line Officer, Park Superintendent, or Forest Supervisor.

The plan should contain the following information and should follow the same format as this outline.

1. Identification of the administrative units involved.
2. Authority for plan - cite Cooperative Fire Protection Agreement between State and Federal Agencies
3. Delineation and description of fire protection elements:
 - a) DPA Boundary
 - b) Pre-planned Initial Attack Response Areas by Dispatch Levels and Resources
 - c) Mutual Aid Move-up and Cover Facilities
 - d) Non-wildfire Emergencies
 - e) Repair of Suppression Activity Damage
4. Special management considerations:
 - a) Wilderness Areas
 - b) Wild and Scenic Rivers
 - c) Research Natural Areas
 - d) Cultural and Archeological Sites
 - e) Roadless Areas

- f) Communities/Structures
 - g) Threatened and Endangered Species
 - h) State Parks with SRA located within Federal Agency DPA
 - i) Other areas identified in land management planning documents or otherwise requiring special procedures
5. Fire Protection Organization including prevention, detection, ground and air attack units, supervisory personnel, drawdown levels and other cooperating agencies:
- a) Resources
 - b) Location
 - c) Anticipated Activation Period
 - d) Staffing Level
 - e) Narrative of Organizational Changes from previous year, whether temporary or permanent
6. Map(s) maintained to support the Operating Plan and attached on an as needed basis:
- a) DPA Boundary
 - b) Fire Protection facilities by agency and location (If local agency, so indicate)
 - c) Pre-planned Initial Attack Response Areas
 - d) Mutual Aid Move-up and Cover Facilities
 - e) Special Management Consideration Areas
7. Operational Procedures
- a) Fire Notification
 - b) Establishment of Initial Attack Dispatch Levels
 - c) Boundary fires including Unified Command and Cost Sharing
 - d) Assistance by Hire and Resource Order Process

- e) Aircraft
- f) “Handcrews” and Dozers
- g) Move-up and Cover
- h) Wildland Fire Situation Analysis
- i) Post-incident Action Analysis
- j) Interagency Sharing of Communications Systems and Frequencies
- k) Interagency Procurement, Loaning, Sharing, or Exchanging of facilities, equipment, and support services
- l) Joint Mobilization Centers or other incident support facilities

8. Fire Prevention

- a) General Cooperative Activities
- b) Information and Education
 - i) Red Flag Operations
 - ii) Joint Press Releases
 - iii) Smokey Bear Program
 - iv) Local Educational Programs
 - v) Fire Prevention Signs
- c) Engineering
 - i) Fire Safe Planning
 - ii) Railroads and Utilities
- d) Enforcement
 - i) Burning and Campfire Permits

ii) Restrictions and Closures

iii) Fire Investigations

9. General Procedures. How to handle:

i) Field Reviews

ii) Updating of Plans

iii) Public Information Distribution

iv) Changes During Year (due to budget cuts, etc.)

COOPERATIVE FIRE PROTECTION AGREEMENT

EXHIBIT C

INTERAGENCY AIRCRAFT UTILIZATION GUIDELINES

INTRODUCTION

Aircraft are limited resources that can have a critical effect on the success of wildfire suppression efforts, therefore the State and Federal Agencies strive to achieve a high level of interagency cooperation in the utilization of aircraft.

The shared acquisition, deployment and utilization of aviation facilities and resources to achieve fire suppression objectives is in the best interest of both state and federal taxpayers.

Therefore, it is incumbent upon the employees of all agencies to work cooperatively to achieve efficient utilization of aviation resources.

DEPLOYMENT AND UTILIZATION

“Agency aircraft” deployed for initial attack in California are strategically located. All firefighting aircraft will be dispatched in accordance with the closest forces concept.

AIRTANKERS

A. Initial Attack

For initial attack on any fire, the responsible State or Federal Agency dispatch office may directly dispatch “uncommitted” airtankers located at the base closest to the fire, regardless of whether the aircraft are owned/operated by State or Federal Agency. Additional airtankers must be requested through dispatch channels.

B. Diverts

If the closest airtankers to a new fire are already committed to other fires, a divert would normally be made, except when the Incident Commander has declared a No Divert due to an immediate, critical threat to life and/or property. The using dispatch office must immediately notify the appropriate higher-level dispatch office of any No Divert situation. While the specific divert process used may vary by protection unit and circumstance, each dispatch office has operational control of any aircraft in its jurisdictional airspace assigned to its agency’s Order Number. In order to meet new incident initial attack needs without undue delay, the responsible dispatch office should normally give the divert directly to the affected aircraft and to the airtanker base, then advise the incident.

Diverts between protection units are to be requested through the appropriate Federal Agency GACC or Region Command Center (RCC).

C. Extended Attack/Major Incidents

All airtankers assigned to an extended attack or major incident will be released each night, regardless of their actual overnight location, and reordered with a new Request Number for the next day.

When arranging the assignment of airtankers to a major incident, the coordinating dispatchers should cooperatively maintain adequate initial attack coverage while meeting the operational needs of the incidents. Assignment of airtankers shall be based on operational need and efficiency, not ownership.

When several airtankers are operating out of one base, individual aircraft should be rotated to assure adequate crew rest and operational equity. The total number of airtankers assigned shall not be augmented by rotation; every airtanker brought into the rotation must have a Request Number and replace one of the aircraft that was already flying.

AIR ATTACK AIRCRAFT

Air Attack aircraft are shared resources, and are used interchangeably on the fires of all cooperating agencies.

A. Initial Attack

The Air Attack aircraft closest to the fire will be directly dispatched by the responsible dispatch office.

If the closest Air Attack aircraft is not available, the ordering unit should place the request through dispatch channels.

B. Diverts

One of the major roles of the Air Tactical Group Supervisor (ATGS) is to ensure airspace safety over an emergency incident. An Air Attack aircraft may be diverted to a new fire only when it is the closest resource and the diversion will not adversely affect the safe separation and coordination of aircraft remaining on the fire. The Air Attack aircraft should be used on the incident with the greatest immediate need for airspace safety coordination. An additional Air Attack aircraft should be ordered for the other incident.

C. Extended Attack/Major Incidents

For long-term air operations, more than one Air Attack aircraft and ATGS should be assigned in rotation to assure adequate crew rest and continuous coverage.

For large or complex operations, a second Air Attack aircraft or a Lead Plane should be utilized as the Airtanker Coordinator, to maintain an appropriate span of control and efficient interface with incident command for the ATGS.

D. Supplemental Detection

Air Attack aircraft may be used as necessary for supplemental detection following lightning storms or for other purposes. Adjacent units should coordinate through appropriate dispatch channels as necessary. Sometimes it may be more efficient to use administrative aircraft or "Call-When-Needed" (CWN) aircraft for supplemental detection, keeping the Air Attack aircraft available for fire response.

LEAD PLANES

Lead planes can be dispatched in support of any cooperating agency's fires and in support of Forest Service contract airtankers in accordance with Forest Service policy.

Lead Planes will be ordered through dispatch channels.

HELICOPTERS

A. Initial Attack

For initial attack or immediate need on any fire, the first helicopter ordered should be the fire helicopter closest to the fire. Orders should be placed through dispatch channels with the agency administering the "helitack" base.

B. Extended Attack/Major Incidents

Requests for fire helicopters after initial attack should be placed through normal dispatch channels.

Because the agency fire helitack units are so valuable on initial attack, it is desirable to replace them with CWN helicopters when such aircraft are available and can meet the mission needs of extended attack or major incidents. If an initial attack fire helicopter is not being used for tactical firefighting purposes, it should be replaced with a CWN helicopter whenever possible.

C. Call-When-Needed (CWN) Helicopters

CWN helicopters will not normally be dispatched as an initial attack resource.

CWN helicopters may be sent to the same fire as an additional resource, or to return a fire helitack unit to initial attack status.

D. Non-Fire Use

Agency fire helicopters may be ordered on a reimbursable basis for emergency non-fire missions (e.g., search and rescue or medivac) using dispatch channels and incident ordering procedures. Agency fire helicopters may be used on interagency prescribed fires in accordance with the Cooperative Agreement for the Use of Prescribed Fire.

MILITARY AIRCRAFT

Normally military aircraft may be used only after available agency and commercial aircraft are committed.

DISPATCHING PROCEDURES

- A. No aircraft shall be dispatched without an Order Number and Request Number from the responsible agency dispatch office.
- B. Authorized State or Federal Agency protection unit dispatch offices may place orders for aircraft on behalf of other agencies for emergency incidents in that unit's DPA.

AIRCRAFT ACCIDENT INVESTIGATION

Pursuant to Public Law 103-411, the National Transportation Safety Board (NTSB) has been given the authority and responsibility to perform all aircraft accident investigations. If requested by the NTSB, the agency on whose order number the aircraft was assigned will take the lead in assisting with the investigation. As a result, the other involved agency(ies) will be in a supporting role. Refer to paragraph 67, Accident Investigations.

The sharing of information between agencies on accident investigations and their findings and probable causes is a valuable tool for safety and must be encouraged.

COOPERATIVE FIRE PROTECTION AGREEMENT

EXHIBIT D

UNIFIED ORDERING POINT

The purpose of the Unified Ordering Point (UOP) is to allow all of the agencies involved on the incident the opportunity to fill requests at the lowest level, including the use of local mutual aid assistance.

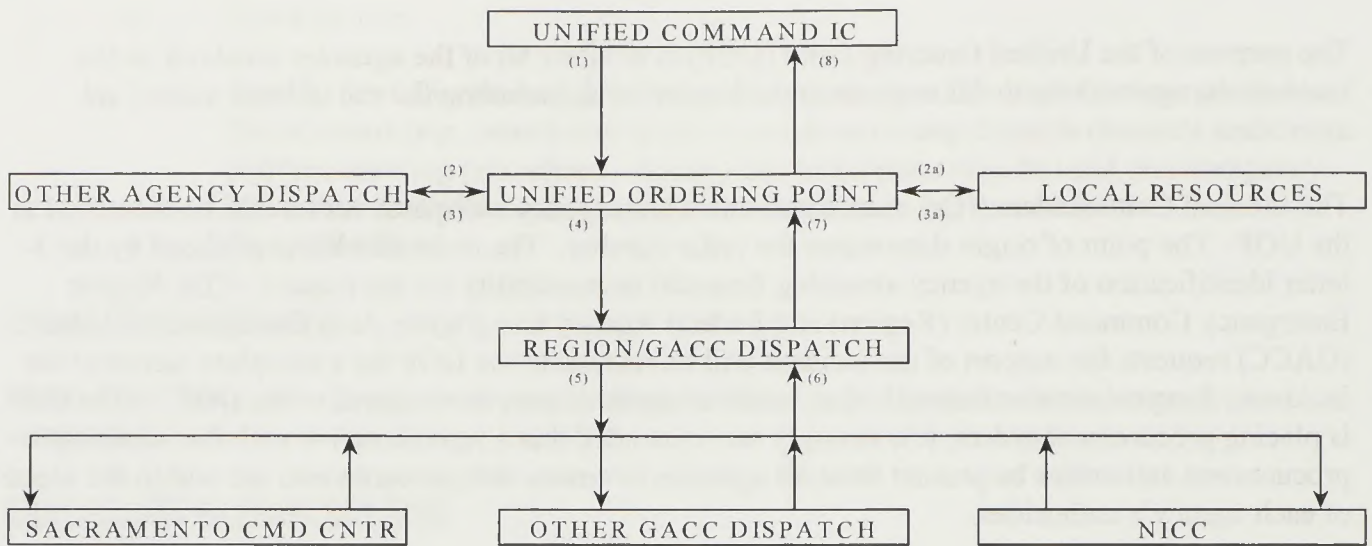
The Incident Commanders (ICs) must determine which agency's dispatch center will be identified as the UOP. The point of origin determines the order number. The order number is prefaced by the 3-letter identification of the agency assuming financial responsibility for the request. CDF Region Emergency Command Center (Region) and Federal Agency Geographic Area Coordination Center (GACC) requests for support of the incident will be relayed to the UOP for a complete record of the incident. A representative from all other involved agencies may be assigned to the UOP. If the UOP is placing procurement orders, it is strongly recommended that a representative with the necessary procurement authorities be present from all agencies to ensure that procurements are within the scope of each agency's authorities.

Agency specific requests, such as a Buying Unit Team, CDF Finance Section Chief, Assistant Disbursing Officer (ADO), will go through the UOP. The UOP will relay the request to the agency involved in the incident that has the specific resource.

After the final request has been closed, the UOP will send a copy of the resource order forms, CDF Form FC-101 or MACS Form 420, to the Region/Federal Agency GACC Dispatch.

The following flowchart identifies the request channels of Unified Command Incident utilizing a UOP.

UNIFIED ORDERING POINT FLOWCHART



All requests and resource information must go from the incident to the UOP.

1. The 3-letter identified prefix with a request number indicates financial responsibility and also denotes to UOP to which agency the request will be relayed. UOP records the requests and routes them to the agency identified in the 3-letter identifier. If that agency is unable to fill the request, the request will be given back to the UOP. At this point, UOP has the opportunity to fill the request, except for agency specific requests, as outlined on the preceding page.

Steps 1 and 8, or 2, 2a, 3, 3a, and 8 should be used.

2. If UOP cannot fill the request, then UOP will relay the request to Region/Federal Agency GACC. At this point RCC/Federal Agency GACC will assume that all incident-involved agencies have been previously contacted.

Steps 1, 2, 3, 4, 7, and 8 should be used.

3. If Region/Federal Agency GACC cannot fill the request, the request will be relayed to the next dispatch level.

Steps 1, 2, 3, 4, 5, 6, 7, and 8 should be used.

COOPERATIVE FIRE PROTECTION AGREEMENT

EXHIBIT E

CHANGES TO DIRECT PROTECTION AREA (DPA)

Changes to DPA boundaries can be divided into two groups referred to as automatic changes and proposed changes.

Automatic Changes may be the result of:

- A. Incorporations/annexations of SRA
- B. Land acquisitions by Federal Agencies
- C. Land exchanges
- D. Removal of lands from SRA by California Board of Forestry
- E. Classification of lands to SRA by California Board of Forestry

Proposed Changes may result from:

- A. Change in protection system
- B. Acreage out of balance
- C. Need to move DPA boundary to line of convenience.

The processes for reporting and initiating the above changes are as follows:

PROCESS FOR AUTOMATIC CHANGES

1. Local protection unit documents change and forwards through agency channels.
2. Local protection unit advises other agencies directly affected.
 - a) Affected agencies forward through channels in accordance with agency policy.
 - b) Automatic change may trigger a proposed change agreed to by the affected local protection units that would then go through the process for proposed changes.
3. Local protection unit forwards to agency central collection point by October 1.

- a) Agency central collection point submits data into CDF Headquarters Fire Protection Section database as required (this may be done by the unit submitting the change).
4. Forward from agency central collection point to interagency committee for review/analysis of impacts as needed.
5. Interagency committee forwards to agency directors with recommendations. (This is done in conjunction with review/analysis of proposed changes).

PROCESS FOR PROPOSED CHANGES

1. Local protection units agree upon and propose change.
2. Proposed change is submitted through involved agencies' channels for agency review and approval.
3. If agencies do not approve, proposal dies. If approved, proposal goes to agency central collection point by October 1.
4. Forward from agency central collection point to interagency committee for review/analysis of impacts.
5. Interagency committee forwards to agency directors with recommendations.
6. If agency directors do not approve, proposal dies. If approved, sign-off. Local protection units are advised.
7. Implementation by February 1.
8. Approved changes returned to agency central collection point for entry into CDF Headquarters Fire Protection Section database.
9. Agency central collection point prints master set of maps and distributes to each agency by April 1.

COOPERATIVE FIRE PROTECTION AGREEMENT

EXHIBIT F

FIRE PREVENTION

ENFORCEMENT OF FIRE LAWS

Authorized State personnel will enforce applicable State Forest and Fire Laws upon FRA in State DPAs. Responsibility for fire prevention inspections on FRA within State DPAs, including timber harvest and other land-use operations, must be identified in the Operating Plan.

Pursuant to California Penal Code Section 830.8, those Federal Agency law enforcement officers and special agents so empowered may enforce State Forest and Fire Laws (except the Forest Practice Rules for timber harvesting) on all SRA lands in Federal Agency DPAs and on FRA in California.

Those Federal Agency law enforcement officers and special agents subject to the last paragraph of California Penal Code Section 830.8(a) (BLM and Forest Service) will first attempt to obtain the required written authorization from the appropriate sheriff or chief of police, for the SRA lands within Federal Agency DPA's and on FRA, in the jurisdiction where they are assigned. If they are unable to obtain the necessary authorization from the appropriate sheriff or chief of police, the Unit Chief responsible for the Operating Plan will be notified for possible assistance in obtaining the required authorization from the sheriff or chief of police for enforcement authority limited to the State Forest and Fire Laws; or, For initiating an appointment as a California Voluntary Fire Warden Peace Officer under California Penal Code Section 830.3(b) or 830.37(c), for the enforcement of State Forest and Fire laws as provided under Public Resources Code Section 4156.

Other Federal Agency employees may be designated representatives of the Director for the performance of the following fire prevention duties on SRA within Federal Agency DPAs:

- A. Issuance of campfire, dooryard, and other burning permits. Air pollution control permit issuance responsibility should be identified in the Operating Plan.
- B. Making fire prevention inspections. Responsibility for fire prevention inspections on timber harvest operations on SRA lands within Federal Agency DPAs must be identified in the Operating Plan.
- C. Requesting criminal prosecution of fire law violators through the District Attorney's Office.

By April 15, the Federal Agencies will submit, to the appropriate State Unit Chief, the names of the Federal Agency employees and volunteers who are trained to perform those duties specified in A, B, and C above, requesting that they be designated representatives of the Director. The State Unit Chief will advise the Federal Agencies of approval of their recommendations by letter. Authorities will expire not later than May 31, two years after issuance of the letter.

The Federal Agencies will provide the State with fire prevention inspection activity data for SRA lands by each February 1 for the preceding year for purposes of program workload analysis. Data will be collected using the California Interagency Fire Prevention Inspection Form. Likewise, the State will provide similar data to the Federal Agencies for State prevention inspection activity on FRA within State DPAs. The data will be forwarded to the agencies' respective state headquarters via channels identified in the Operating Plan.

All Federal Agency personnel initiating criminal actions on behalf of the Director will submit information necessary for the State Law Enforcement Report (LE-30). Likewise, the State will make annual reports of criminal actions it initiates for violations on FRA within State DPAs. Enforcement data will be forwarded to the agency's respective state headquarters via channels identified in the Operating Plan.

DETERMINATION OF CAUSE AND PRESERVATION OF EVIDENCE

As initial action is taken on a fire, the protecting agency is responsible to gather and preserve information and evidence pertaining to the origin and cause of the fire. To the extent permitted by Federal and State law, the protecting agency will provide investigation files relative to the fire to the other agency. Each agency will promptly notify the other when there is potential for cost recovery on a fire occurring on lands under the jurisdiction of the other agency.

BURNING AND CAMPFIRE PERMITS

In accordance with current instructions, permits for campfire (CDF form LE-63), dooryard premises burning (CDF form LE-62), and other burning (CDF form LE-5) (except vegetation management program and brushland conversion burning (CDF form LE-7) pursuant to California Public Resources Code sections 4462-4476 and 4491-4494) on State Responsibility lands in Federal Agency DPAs will be issued by the Federal Agency or local fire protection district personnel authorized to do so by the Director. Local fire protection district personnel so authorized will notify the affected Federal Agencies when dooryard premises burning permits are issued for areas protected by these agencies. All other permits will be issued by authorized State personnel only.

Permits for burning slash on SRA lands within Federal Agency DPAs covered by a Timber Harvesting Plan where stocking requirements have not been met will be issued only with the approval of the State employee supervising the plan. The State will advise the Federal Agencies of active Timber Harvest Plans in their DPAs. Channels for information flow will be detailed in the Operating Plan.

The Federal Agencies will consult the State when burning projects are being planned and conducted on FRA in State DPAs. The State will consult the Federal Agencies when burning projects are being planned and conducted on private and SRA State Park lands in Federal DPAs. Provisions for joint planning for burning projects shall be included in the Operating Plan.

RESTRICTIONS AND CLOSURES

When any protection unit plans, activates, or deactivates any suspension, closure, or restriction, the adjacent protection unit(s) will be consulted and a copy of the notice immediately provided.

FIRE SAFE PLANNING

The Federal Agencies will be actively involved in the Fire Safe planning process for SRA lands within their respective DPAs. Pursuant to California Public Resources Code Section 4290, the State Board of Forestry has directed that a single contact point be established within each county for the purpose of implementing Title 14, Division 1.5, Subchapter 2, Articles 1-5, California Code of Regulations. The State will be the primary interface with local government and will, in most cases, be that contact. In some cases, a Federal Agency may agree to be designated the contact point if the State's presence is limited or efficiencies can be gained. Such designation will be determined by the State in consultation with the involved Federal Agency and be documented in the appropriate Operating Plan. Whenever appropriate, the State and the Federal Agencies will work in concert within any county to take advantage of area knowledge and to provide agency specific input.

Federal DPAs

San Joaquin Hills National Monument

State DPAs

The following information provides background information on the Federal DPAs. The Federal Agencies will be actively involved in the Fire Safe planning process for SRA lands within their respective DPAs. Pursuant to California Public Resources Code Section 4290, the State Board of Forestry has directed that a single contact point be established within each county for the purpose of implementing Title 14, Division 1.5, Subchapter 2, Articles 1-5, California Code of Regulations. The State will be the primary interface with local government and will, in most cases, be that contact. In some cases, a Federal Agency may agree to be designated the contact point if the State's presence is limited or efficiencies can be gained. Such designation will be determined by the State in consultation with the involved Federal Agency and be documented in the appropriate Operating Plan. Whenever appropriate, the State and the Federal Agencies will work in concert within any county to take advantage of area knowledge and to provide agency specific input.

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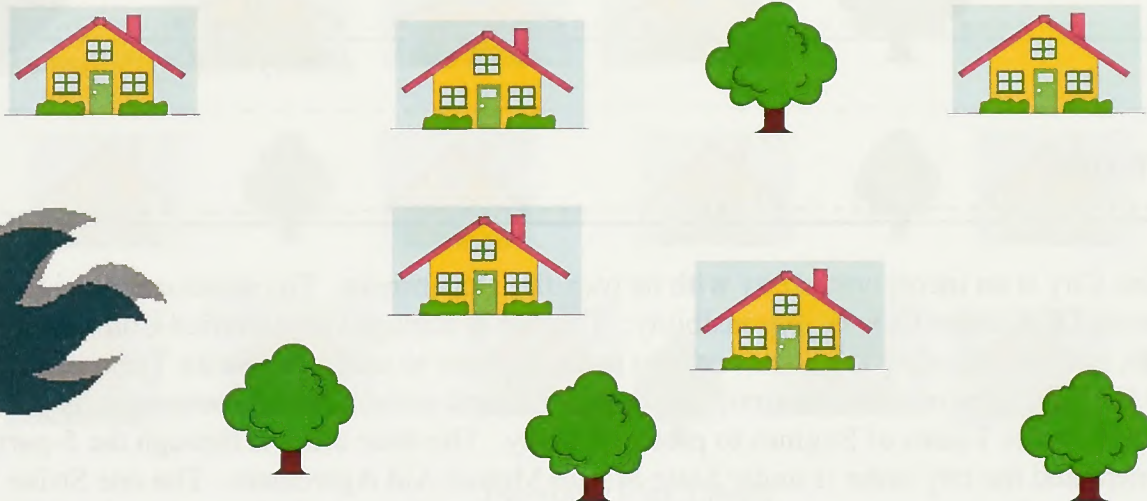
COOPERATIVE FIRE PROTECTION AGREEMENT

EXHIBIT G

STRUCTURE PROTECTION GUIDELINES

SCENARIOS

THIS SCENARIO DOES NOT SET PRECEDENT.
Each incident is unique.

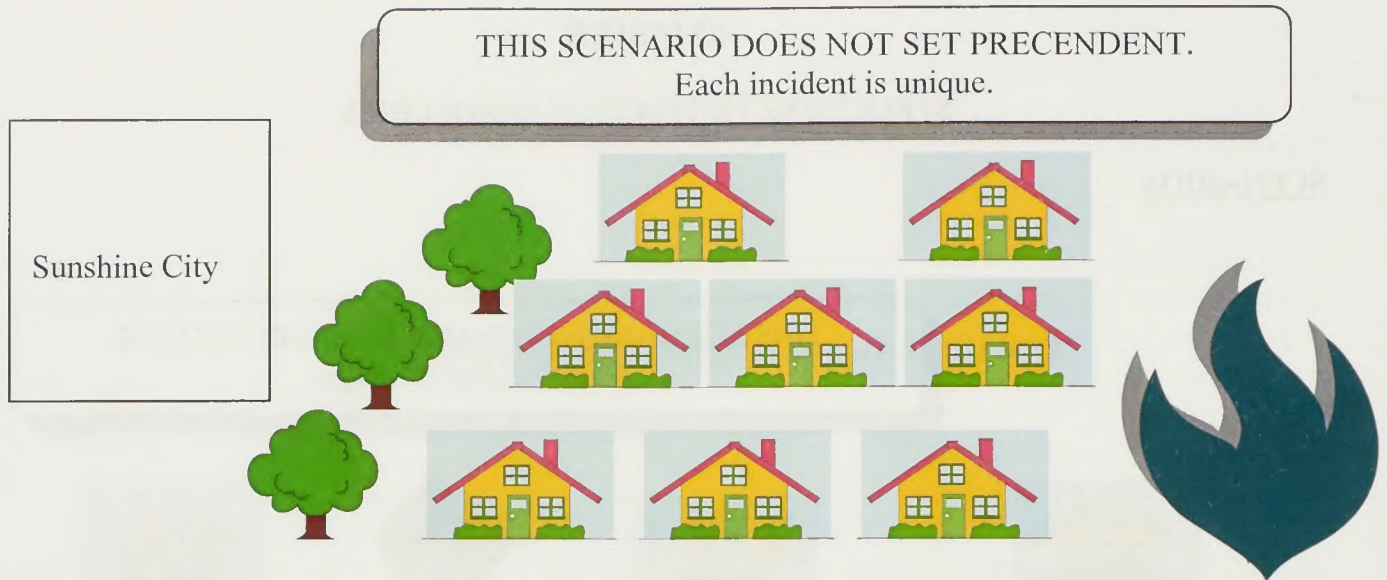


Federal DPA

State DPA

The scattered houses are on private land totally within the Federal DPA. The Federal agency has wildfire protection responsibility for all federal and private lands in this area. A county fire department has structure protection responsibility in this area. The fire is managed by a Unified Command with county fire department concerns being met by participating as a member of this Unified Command. The IC's jointly agreed to order five Strike Teams of Engines for perimeter control / structure protection through the Unified Ordering Point to protect the structures from the approaching wildfire. The Strike Teams are ordered under a local agreement or the 5-Party Agreement. The Strike Teams are reimbursed under one of these agreements by the federal agency that ordered them. County fire department resources protecting structures were not compensated by the federal agency.

THIS SCENARIO HAS THE FIRE IN A SPECIFIC DPA BUT THIS SCENARIO
IS APPLICABLE TO THE DPA OF ANY WILDLAND AGENCY.



STATE DPA

Sunshine City is an incorporated city with its own fire Department. The structures outside the city are in the state DPA under County responsibility. The fire is managed as a Unified Command between the state, county and city. The joint decision is for the state to order one Strike Team of Engines to protect the structures in close proximity to the wildfire and assist with perimeter control and the city to order 10 Strike Teams of Engines to protect the city. The state order is through the 5-party Agreement and the city order is under State Master Mutual Aid Agreement. The one Strike Team is reimbursed by the state agency and the 10 Strike Teams are furnished at no cost to the city. The county resources that assisted the effort were not compensated by the state.

(In this scenario it is important to recognize that it is a unified command and that it was a joint decision for the city to order the engines to protect the city through State Master Mutual Aid. This was done due to the short duration of need, generally 12 hours or less.)

THIS SCENARIO HAS THE FIRE IN A SPECIFIC DPA BUT THIS SCENARIO IS APPLICABLE TO THE DPA OF ANY WILDLAND AGENCY.

THIS SCENARIO DOES NOT SET PRECEDENT.
Each incident is unique.



Federal DPA

Local Responsibility Area (LRA)



The City of Bayshore is an incorporated city and contracts with the County for structural fire protection. The Bayshore city limits stop at the Forest Service Direct Protection Area (DPA) boundary. A wildfire starts on Forest Service land protected by the Forest Service. The fire spreads rapidly and is threatening the City of Bayshore. A unified command is established between the Forest Service and the County Fire Department.

A joint decision by the Incident Commanders is made to order 10 Strike Teams of Engines for structure protection through the 5 Party Agreement. Because of the threat and risk to the Bayshore City LRA, there is joint IC's agreement to share the cost of the 10 Strike Teams equally. The 10 strike teams are reimbursed by the Forest Service. The Forest Service and Bayshore City will share the cost through a cost share agreement for the fire.

THIS SCENARIO HAS THE FIRE IN A SPECIFIC DPA BUT THIS SCENARIO
IS APPLICABLE TO THE DPA OF ANY WILDLAND AGENCY.

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APPENDIX J

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APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
	36		Ceramic scatter	1951	Not evaluated	
	37		Ceramic scatter	1951	Not evaluated	
	69		Camp site, possible cremation	1951	Not evaluated	
	403		Isolate—lithic	1976	Not eligible**	
	788		Burials, lithics scatter	1973	Recommended eligible	RECON 2009
	789		Ceramic scatter	1973	Not evaluated	
	790		Ceramic scatter	1973	Not evaluated	
	791		Ceramic, ground stone	1973	Not evaluated	
	801		missing site form	n.d.	Not evaluated	
	1150		Ceramic, ground stone	1975	Not evaluated	
	1151		Rock feature	1975	Not evaluated	
	1152		Ceramic scatter	1975	Not evaluated	
	1153		Ceramic scatter	1975	Not evaluated	
	1383		Ceramic scatter	1976	Not evaluated	
	1384		Ceramic scatter	1976	Not evaluated	
	1385		Ceramic scatter	1976	Not evaluated	
	1386		Isolate—ceramic	1976	Not eligible**	
	2416		Ceramic scatter	1976	Not evaluated	
	2417		Ceramic scatter	1976	Not evaluated	
	2667		Prehistoric trail, ceramics	1978	Not evaluated	
	2670		Ceramic scatter	1978	Not evaluated	
	2671		missing site form	n.d.	Not evaluated	
	3058		Camp site, historic trash scatter	1978	Not evaluated	
	3059		Ceramic scatter	1978	Not evaluated	
	3060		Ceramic scatter with possible cremation	1978	Recommended eligible	RECON 2009
	3061		Ceramic scatter	1978	Not evaluated	

APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
	3065		Ceramic scatter	n.d.	Not evaluated	
3364H	3364		Dry lake bed	n.d.	Not evaluated	
	3424		Southern Pacific Railroad	2000, 1997	Recommended eligible	Smith et al. 2008
	3614		Historic trash scatter	1978	Not evaluated	
	3615		Historic trash scatter	1978	Not evaluated	
	3793		Ceramic scatter	n.d.	Not evaluated	
	3794		Isolate—Historic camel bone	n.d.	Not eligible**	
	3795		Ceramic scatter	n.d.	Not evaluated	
	3811		Ceramic scatter	1979	Not evaluated	
	3812		Isolate—ceramic	1979	Not eligible**	
	3813		Isolate—tool	n.d.	Not eligible**	
	3890		Isolate—glass	1979	Not eligible**	
	4148		Historic trash scatter	1979	Not evaluated	
	4149		Isolate—glass	1979	Not eligible**	
	4150		Historic trash scatter	1979	Not evaluated	
	4151		Isolate—ceramic	1979	Not eligible**	
	4153		Historic trash scatter	1979	Not evaluated	
	4154		Lithic scatter	n.d.	Not evaluated	
	4155		Isolate—glass	1979	Not eligible**	
	4156		Isolate—cores	1979	Not eligible**	
	4157		Isolate—FLA	1979	Not eligible**	
	4158		Isolate—cores	1979	Not eligible**	
	4159		Isolate—glass	1979	Not eligible**	
	4160		Isolate—cores	1979	Not eligible**	
	4161		Isolate—glass	1979	Not eligible**	
	4162		Historic trash scatter	1979	Not evaluated	
	4163		Isolate—glass	1979	Not eligible**	
	4164		Lithic scatter	1979	Not evaluated	
	4165		Isolate—lithic	1979	Not eligible**	

CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
	4166		Historic rock feature	1979	Not eligible	Smith et al. 2008
	4167		missing site form	n.d.	Not evaluated	
	4168		Historic trash scatter	1979	Not evaluated	
	4169		Isolate—glass	1979	Not eligible**	
	4170		Isolate—FLA	1979	Not eligible**	
	4183		Temporary camp site	n.d.	Not evaluated	
	4184		Lithic scatter	1980	Not evaluated	
	4185		Isolate—cores	1980	Not eligible**	
	4397		Isolate—ceramic	n.d.	Not eligible**	
	4398		Ceramic scatter	n.d.	Not evaluated	
	4409		Bullet scatter	1981	Not evaluated	
	4410		Ceramic scatter, historic trash scatter	1981	Not evaluated	
	4411		Historic trash scatter	1981	Not evaluated	
	4621		Graveyard	1982	Recommended eligible	Smith et al. 2008
	4626		Ceramic scatter	1981	Not evaluated	
	4627		Ceramic scatter	1981	Not evaluated	
	4628		Ceramic scatter	1981	Not evaluated	
	4629		missing site form	n.d.	Not evaluated	
	4630		Temporary camp site	1979	Not evaluated	
	4631		Ceramic scatter	1981	Not evaluated	
	4632		Ceramic scatter	1981	Not evaluated	
	4633		Ceramic, lithics	1979	Not evaluated	
	4634		Temporary camp site	1981	Not evaluated	
	4635		Ceramic scatter	1981	Not evaluated	
	4636		Ceramic scatter	1981	Not evaluated	
	4658		Ceramic, ground stone	1981	Not evaluated	
	4659		Ceramic scatter	1978	Not evaluated	
	4660		Isolate—ceramic	1978	Not eligible**	
	4661		Isolate—ceramic	1978	Not eligible**	
	4662		Isolate—ceramic	1978	Not eligible**	

APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
	3065		Ceramic scatter	n.d.	Not evaluated	
3364H	3364		Dry lake bed	n.d.	Not evaluated	
	3424		Southern Pacific Railroad	2000, 1997	Recommended eligible	Smith et al. 2008
	3614		Historic trash scatter	1978	Not evaluated	
	3615		Historic trash scatter	1978	Not evaluated	
	3793		Ceramic scatter	n.d.	Not evaluated	
	3794		Isolate—Historic camel bone	n.d.	Not eligible**	
	3795		Ceramic scatter	n.d.	Not evaluated	
	3811		Ceramic scatter	1979	Not evaluated	
	3812		Isolate—ceramic	1979	Not eligible**	
	3813		Isolate—tool	n.d.	Not eligible**	
	3890		Isolate—glass	1979	Not eligible**	
	4148		Historic trash scatter	1979	Not evaluated	
	4149		Isolate—glass	1979	Not eligible**	
	4150		Historic trash scatter	1979	Not evaluated	
	4151		Isolate—ceramic	1979	Not eligible**	
	4153		Historic trash scatter	1979	Not evaluated	
	4154		Lithic scatter	n.d.	Not evaluated	
	4155		Isolate—glass	1979	Not eligible**	
	4156		Isolate—cores	1979	Not eligible**	
	4157		Isolate—FLA	1979	Not eligible**	
	4158		Isolate—cores	1979	Not eligible**	
	4159		Isolate—glass	1979	Not eligible**	
	4160		Isolate—cores	1979	Not eligible**	
	4161		Isolate—glass	1979	Not eligible**	
	4162		Historic trash scatter	1979	Not evaluated	
	4163		Isolate—glass	1979	Not eligible**	
	4164		Lithic scatter	1979	Not evaluated	
	4165		Isolate—lithic	1979	Not eligible**	

APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
	4166		Historic rock feature	1979	Not eligible	Smith et al. 2008
	4167		missing site form	n.d.	Not evaluated	
	4168		Historic trash scatter	1979	Not evaluated	
	4169		Isolate—glass	1979	Not eligible**	
	4170		Isolate—FLA	1979	Not eligible**	
	4183		Temporary camp site	n.d.	Not evaluated	
	4184		Lithic scatter	1980	Not evaluated	
	4185		Isolate—cores	1980	Not eligible**	
	4397		Isolate—ceramic	n.d.	Not eligible**	
	4398		Ceramic scatter	n.d.	Not evaluated	
	4409		Bullet scatter	1981	Not evaluated	
	4410		Ceramic scatter, historic trash scatter	1981	Not evaluated	
	4411		Historic trash scatter	1981	Not evaluated	
	4621		Graveyard	1982	Recommended eligible	Smith et al. 2008
	4626		Ceramic scatter	1981	Not evaluated	
	4627		Ceramic scatter	1981	Not evaluated	
	4628		Ceramic scatter	1981	Not evaluated	
	4629		missing site form	n.d.	Not evaluated	
	4630		Temporary camp site	1979	Not evaluated	
	4631		Ceramic scatter	1981	Not evaluated	
	4632		Ceramic scatter	1981	Not evaluated	
	4633		Ceramic, lithics	1979	Not evaluated	
	4634		Temporary camp site	1981	Not evaluated	
	4635		Ceramic scatter	1981	Not evaluated	
	4636		Ceramic scatter	1981	Not evaluated	
	4658		Ceramic, ground stone	1981	Not evaluated	
	4659		Ceramic scatter	1978	Not evaluated	
	4660		Isolate—ceramic	1978	Not eligible**	
	4661		Isolate—ceramic	1978	Not eligible**	
	4662		Isolate—ceramic	1978	Not eligible**	

APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
	4761		Ceramic, lithic	2003, 1981	Not eligible	Hangan 2003
	4762		Isolate—ceramic	1981	Not eligible**	
	4764		Historic plank road and associated debris	1997, 1982	Recommended eligible	Nomination Form/PHR Associates and Carrico 1989
	4765		Historic trash scatter	1982	Not evaluated	
	4767		Ceramic scatter	1981	Not evaluated	
	4768		Isolate—ceramic	1981	Not eligible**	
	4769		Isolate—ceramic	1981	Not eligible**	
	4910		Ceramic scatter	1982	Not evaluated	
	5077		Lithic scatter	1984	Not evaluated	
	5281		missing site form	n.d.	Not evaluated	
	5282		missing site form	n.d.	Not evaluated	
	5283		missing site form	n.d.	Not evaluated	
	6546		Ceramic scatter	1991, 1955	Not evaluated	
	6640		Isolate—ceramic	1991	Not eligible**	
	7130		All American Canal	2001, 1997, 1995, 1994	Recommended eligible	Schaefer and Andrews 2205, Queen 1999
	7158		Transmission Line Knob—Drop 4	2006, 2000, 1994	Not eligible**	McCorkle et al. 2006
	7649		Ceramic scatter	n.d.	Not evaluated	
13-007858	7658		Old Coachella Canal	n.d.	Recommended eligible	Schaefer and Ghablain 2003
	7685		Quarry	n.d.	Not evaluated	
13-007909	7708		Rock feature, Old Yuman Road	n.d.	Recommended eligible	Schaefer and Andrews 2005
	7800		Ceramic scatter	1997	Not evaluated	
	7806		Isolate—ceramic	1997	Not eligible**	
	7901		missing site form	n.d.	Not evaluated	

CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
	7910		missing site form	n.d.	Not evaluated	
	7921		missing site form	n.d.	Not evaluated	
	7922		missing site form	n.d.	Not evaluated	
	7923		missing site form	n.d.	Not evaluated	
	8191		Ogilby railroad station	n.d.	Recommended eligible	Cleland et al. 2003, Smith et al. 2008
	8211		Historic trash scatter	n.d.	Not eligible	Smith et al. 2008
	8212		Historic trash scatter	n.d.	Not eligible	Smith et al. 2008
	8213		Historic trash scatter	n.d.	Not eligible	Smith et al. 2008
	8216		Former Amos Station	n.d.	Recommended eligible	Smith et al. 2008
	8218		Former Acolita Station	n.d.	Recommended eligible	Smith et al. 2008
	8285		missing site form	n.d.	Not evaluated	
13-008896	8314		Ceramic scatter	2004, 2006	Recommended eligible (as part of discontiguous district)	Schaefer and Andrews 2005
	8416		Historic trash scatter, railroad grade	2007	Not eligible	Smith et al. 2008
	8423		Historic foundation, trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8424		Historic trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8623	UP-2	Historic foundation, trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8623	UP-5	Historic trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8624		Historic trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8633		Historic trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8634		Former Glamis station	2007	Recommended eligible	Smith et al. 2008
	8635		Historic trash scatter, railroad grade	2007	Not eligible	Smith et al. 2008
13-008619			Ceramic scatter	2002	Not eligible	Underwood and Cleland 2002

APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
	4761		Ceramic, lithic	2003, 1981	Not eligible	Hangan 2003
	4762		Isolate—ceramic	1981	Not eligible**	
	4764		Historic plank road and associated debris	1997, 1982	Recommended eligible	Nomination Form/PHR Associates and Carrico 1989
	4765		Historic trash scatter	1982	Not evaluated	
	4767		Ceramic scatter	1981	Not evaluated	
	4768		Isolate—ceramic	1981	Not eligible**	
	4769		Isolate—ceramic	1981	Not eligible**	
	4910		Ceramic scatter	1982	Not evaluated	
	5077		Lithic scatter	1984	Not evaluated	
	5281		missing site form	n.d.	Not evaluated	
	5282		missing site form	n.d.	Not evaluated	
	5283		missing site form	n.d.	Not evaluated	
	6546		Ceramic scatter	1991, 1955	Not evaluated	
	6640		Isolate—ceramic	1991	Not eligible**	
	7130		All American Canal	2001, 1997, 1995, 1994	Recommended eligible	Schaefer and Andrews 2205, Queen 1999
	7158		Transmission Line Knob—Drop 4	2006, 2000, 1994	Not eligible**	McCorkle et al. 2006
	7649		Ceramic scatter	n.d.	Not evaluated	
13-007858	7658		Old Coachella Canal	n.d.	Recommended eligible	Schaefer and Ghablain 2003
	7685		Quarry	n.d.	Not evaluated	
13-007909	7708		Rock feature, Old Yuman Road	n.d.	Recommended eligible	Schaefer and Andrews 2005
	7800		Ceramic scatter	1997	Not evaluated	
	7806		Isolate—ceramic	1997	Not eligible**	
	7901		missing site form	n.d.	Not evaluated	

APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
	7910		missing site form	n.d.	Not evaluated	
	7921		missing site form	n.d.	Not evaluated	
	7922		missing site form	n.d.	Not evaluated	
	7923		missing site form	n.d.	Not evaluated	
	8191		Ogilby railroad station	n.d.	Recommended eligible	Cleland et al. 2003, Smith et al. 2008
	8211		Historic trash scatter	n.d.	Not eligible	Smith et al. 2008
	8212		Historic trash scatter	n.d.	Not eligible	Smith et al. 2008
	8213		Historic trash scatter	n.d.	Not eligible	Smith et al. 2008
	8216		Former Amos Station	n.d.	Recommended eligible	Smith et al. 2008
	8218		Former Acolita Station	n.d.	Recommended eligible	Smith et al. 2008
	8285		missing site form	n.d.	Not evaluated	
13-008896	8314		Ceramic scatter	2004, 2006	Recommended eligible (as part of discontinuous district)	Schaefer and Andrews 2005
	8416		Historic trash scatter, railroad grade	2007	Not eligible	Smith et al. 2008
	8423		Historic foundation, trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8424		Historic trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8623	UP-2	Historic foundation, trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8623	UP-5	Historic trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8624		Historic trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8633		Historic trash scatter, railroad grade	2006	Not eligible	Smith et al. 2008
	8634		Former Glamis station	2007	Recommended eligible	Smith et al. 2008
	8635		Historic trash scatter, railroad grade	2007	Not eligible	Smith et al. 2008
13-008619			Ceramic scatter	2002	Not eligible	Underwood and Cleland 2002

APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
13-008620			Ceramic scatter	2002	Not eligible	Underwood and Cleland 2002
13-008621			Bullet scatter	2002	Not eligible	Underwood and Cleland 2002
13-008622			Ceramic scatter	2002	Not eligible	Underwood and Cleland 2002
13-008623			Isolate—core	2002	Not eligible**	Underwood and Cleland 2002
13-008624			Isolate—ceramic	2002	Not eligible**	Underwood and Cleland 2002
		AAC3	Ceramic scatter	n.d.	Recommended Eligible as possible district	Schaefer and Andrews 2005
		AAC4	Ceramic scatter	n.d.	Recommended Eligible as possible district	Schaefer and Andrews 2005
		AAC-ISO-1	missing site form	n.d.	Not eligible**	
	A2-P1	A2-P1	missing site form	n.d.	Not evaluated	
	A7H	A7H	Historic workshop	n.d.	Recommended eligible	Schaefer and Andrews 2005
	ISO-A2-1	ISO-A2-1	Isolate	n.d.	Not eligible**	
	ISO-A2-2	ISO-A2-2	Isolate	n.d.	Not eligible**	
		B2	Ceramic scatter	n.d.	Recommended eligible as possible district	Schaefer and Andrews 2005
		B3H	missing site form	n.d.	Not evaluated	
		B4	Ceramic scatter	n.d.	Recommended eligible as possible district	Schaefer and Andrews 2005
		B5	Ceramic scatter	n.d.	Recommended eligible as possible district	Schaefer and Andrews 2005
		ISO-B3	Isolate	n.d.	Not eligible**	
		ISO-B4	Isolate	n.d.	Not eligible**	

CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
		ISO-B4-1	Isolate	n.d.	Not eligible**	
		ISO-B4-2	Isolate	n.d.	Not eligible**	
		ISO-B5	Isolate	n.d.	Not eligible**	
		ISO-B6	Isolate	n.d.	Not eligible**	
		ISO-B7	Isolate	n.d.	Not eligible**	
		ISO-B8	Isolate	n.d.	Not eligible**	
		ISO-B9	Isolate	n.d.	Not eligible**	
		C12-1	Ceramic scatter	n.d.	Recommended eligible as possible district	Schaefer and Andrews 2005
		C23-1	Historic trash scatter	n.d.	Not eligible	Schaefer and Andrews 2005
		D1-1H	Historic trash scatter	n.d.	Not eligible	Schaefer and Andrews 2005
		BM No. 209	Border monument	2007	Recommended eligible as possible district	Rosenberg and Smith 2008
13-009615		BM No. 210	Border monument	2007	Recommended eligible as possible district	Cheever and Berryman 2008
13-009616		BM No. 211	Border monument	2007	Recommended eligible as possible district	Cheever and Berryman 2008
13-009546		ECBF Iso-1	Isolate—ceramic	2007	Not eligible**	
	D2-8	D2-8	Evan-Hewes Hwy/Old Route 80	2005	Not eligible	Cleland and Apple 2006
13-008961	8356	IID-AY-4	Old Hwy 80	2006	Not eligible	Apple et al. 2006
13-009019		IID-AY-ISO-1	Isolate—historic ceramic	2006	Not eligible**	
		UP-ISO-1	Isolate—ceramic	n.d.	Not eligible**	
		UP-ISO-2	Isolate—ceramic	n.d.	Not eligible**	
		UP-ISO-3	Isolate—historic glass	n.d.	Not eligible**	
		UP-ISO-12	Isolate—historic glass	n.d.	Not eligible**	
		UP-ISO-13	Isolate—historic glass	n.d.	Not eligible**	

APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
13-008620			Ceramic scatter	2002	Not eligible	Underwood and Cleland 2002
13-008621			Bullet scatter	2002	Not eligible	Underwood and Cleland 2002
13-008622			Ceramic scatter	2002	Not eligible	Underwood and Cleland 2002
13-008623			Isolate—core	2002	Not eligible**	Underwood and Cleland 2002
13-008624			Isolate—ceramic	2002	Not eligible**	Underwood and Cleland 2002
		AAC3	Ceramic scatter	n.d.	Recommended Eligible as possible district	Schaefer and Andrews 2005
		AAC4	Ceramic scatter	n.d.	Recommended Eligible as possible district	Schaefer and Andrews 2005
		AAC-ISO-1	missing site form	n.d.	Not eligible**	
	A2-P1	A2-P1	missing site form	n.d.	Not evaluated	
	A7H	A7H	Historic workshop	n.d.	Recommended eligible	Schaefer and Andrews 2005
		ISO-A2-1	Isolate	n.d.	Not eligible**	
	ISO-A2-2	ISO-A2-2	Isolate	n.d.	Not eligible**	
		B2	Ceramic scatter	n.d.	Recommended eligible as possible district	Schaefer and Andrews 2005
		B3H	missing site form	n.d.	Not evaluated	
		B4	Ceramic scatter	n.d.	Recommended eligible as possible district	Schaefer and Andrews 2005
		B5	Ceramic scatter	n.d.	Recommended eligible as possible district	Schaefer and Andrews 2005
		ISO-B3	Isolate	n.d.	Not eligible**	
		ISO-B4	Isolate	n.d.	Not eligible**	

APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
		ISO-B4-1	Isolate	n.d.	Not eligible**	
		ISO-B4-2	Isolate	n.d.	Not eligible**	
		ISO-B5	Isolate	n.d.	Not eligible**	
		ISO-B6	Isolate	n.d.	Not eligible**	
		ISO-B7	Isolate	n.d.	Not eligible**	
		ISO-B8	Isolate	n.d.	Not eligible**	
		ISO-B9	Isolate	n.d.	Not eligible**	
		C12-1	Ceramic scatter	n.d.	Recommended eligible as possible district	Schaefer and Andrews 2005
		C23-1	Historic trash scatter	n.d.	Not eligible	Schaefer and Andrews 2005
		D1-1H	Historic trash scatter	n.d.	Not eligible	Schaefer and Andrews 2005
		BM No. 209	Border monument	2007	Recommended eligible as possible district	Rosenberg and Smith 2008
13-009615		BM No. 210	Border monument	2007	Recommended eligible as possible district	Cheever and Berryman 2008
13-009616		BM No. 211	Border monument	2007	Recommended eligible as possible district	Cheever and Berryman 2008
13-009546		ECBF Iso-1	Isolate—ceramic	2007	Not eligible**	
	D2-8	D2-8	Evan-Hewes Hwy/Old Route 80	2005	Not eligible	Cleland and Apple 2006
13-008961	8356	IID-AY-4	Old Hwy 80	2006	Not eligible	Apple et al. 2006
13-009019		IID-AY-ISO-1	Isolate—historic ceramic	2006	Not eligible**	
		UP-ISO-1	Isolate—ceramic	n.d.	Not eligible**	
		UP-ISO-2	Isolate—ceramic	n.d.	Not eligible**	
		UP-ISO-3	Isolate—historic glass	n.d.	Not eligible**	
		UP-ISO-12	Isolate—historic glass	n.d.	Not eligible**	
		UP-ISO-13	Isolate—historic glass	n.d.	Not eligible**	

APPENDIX J
CULTURAL RESOURCES SITES RECORDED IN THE PLANNING AREA BY NATIONAL REGISTER STATUS (CONT.)

Primary Number	Trinomial (CA-IMP-)	Temporary Number*	Description	Last Recorded	NR Status	Citation
		UP-ISO-14	Isolate—historic metal can	n.d.	Not eligible**	
		UP-ISO-15	Isolate—historic glass	n.d.	Not eligible**	
		UP-ISO-16	Isolate—historic metal can	n.d.	Not eligible**	
		UP-ISO-18	Isolate—historic glass	n.d.	Not eligible**	

* = Temporary number is listed when trinomial is unknown.

Not eligible** = Isolates are not considered eligible.

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APPENDIX K

United States Department of the Interior Bureau of Land Management Scenic Quality Field Inventory	Field Inventory:	December 2008
	Evaluators:	RECON & BLM
	District:	California Desert District
	Field Office:	El Centro California Field Office
	Resource Area:	Imperial Sand Dunes Recreation Area
	Scenic Quality Rating Unit:	SQRU-1 Dunes (Large)

Landscape Character: (see representative photos)

	Landform/Water	Vegetation	Structures (General)
Form	Large-scale, gently rolling dunes system; some steep drop-offs at slip faces on leeward side of dunes landform is highly unique and monumental in regional context	Minimal vegetative cover; small irregular forms. Little variety but high contrast between vegetation and dunes	Few structures; rectangular form of radio repeater station, and occasional signs; planar form of roadways adjacent to the dunes
Line	Curvilinear and serpentine	Irregular lines of sparse vegetation	Structures and signs are linear and perpendicular; roadways are relatively straight to slightly curving
Color	Dominant color is tan (sand); shadow patterns create interesting interplay between light and dark tones; colors at sunrise/sunset range from light pinks to orange-red reflected from sky and clouds	Light greens and gray-greens; lime green of Mormon tea; darker greens of occasional creosote. Color of vegetation contrasts greatly with predominantly monochrome sand color	Metallic grays, rust color and earth tones; dark grays of paved roads; gray and black tones of structures (bathrooms)
Texture	Even, smooth texture with soft surface appearance; more coarse texture where tracks of vehicles, people, and animals are evident	Moderate to coarse; much depends on scale	Smooth to moderately coarse

Narrative / Representative landscape character:

Gently rolling to steep dune formations with sharp serpentine edges at crests, rising dramatically from adjacent, relatively level to gently sloping, desert basin floor. This is the large core of the dunes system, which is buffered and enhanced by the adjacent outer and smaller dunes and creosote scrub plains. Landform is the dominant visual element, particularly as it contrasts so strongly with the desert landscape. The rugged and colorful Chocolate, Cargo Muchacho, and other mountains to the east contrast sharply in form and color and add visual interest to the area. Although the tan colors of the

sand are generally monochromatic, there are variations in light and shadow throughout the day and brilliant colors at sunrise and sunset. Vegetation is generally not visually evident, but there are a variety of small forbs and shrubs at low densities that provide some visual interest. Microphyll woodlands to the east provide additional visual interest. This is a regionally significant landscape element of great visual interest. Night-time views in high-use areas during weekends and holidays include lights from numerous recreational vehicles as well as unauthorized fireworks displays set off by visitors.

Scenic Quality Score & Classification:

	High (4-5)	Medium (3)	Low (1-2)	Total / Rationale	Scenic Quality Classification <input checked="" type="checkbox"/> A (>18) <input type="checkbox"/> B (12-18) <input type="checkbox"/> C (<12)
Landform	5			Unique and dynamic	
Vegetation			1	Minimal vegetation evident	
Water			0	No surface water	
Color		3		Monochrome, but with shade/shadow contrast during day; often brilliant sunrise and sunset color hues	
Adjacent Scenery		3		Adjacent small dunes and distant Mts. enhance scenic quality	
Scarcity	5			Large dunes are very unique to region; internationally significant	
Cultural Modification		3		Few and Minor structural elements; do not noticeably detract	
Totals:	10	9	1	20	

Evaluation Team consisted of the following individuals:

BLM El Centro Field Office

- John Johnson, Visual, Recreation, and Wilderness Resources Specialist
- Erin Dreyfuss, RAMP Team Lead, Environmental Protection Specialist
- Neil Hamada, Imperial Sand Dunes Recreation Area Manager

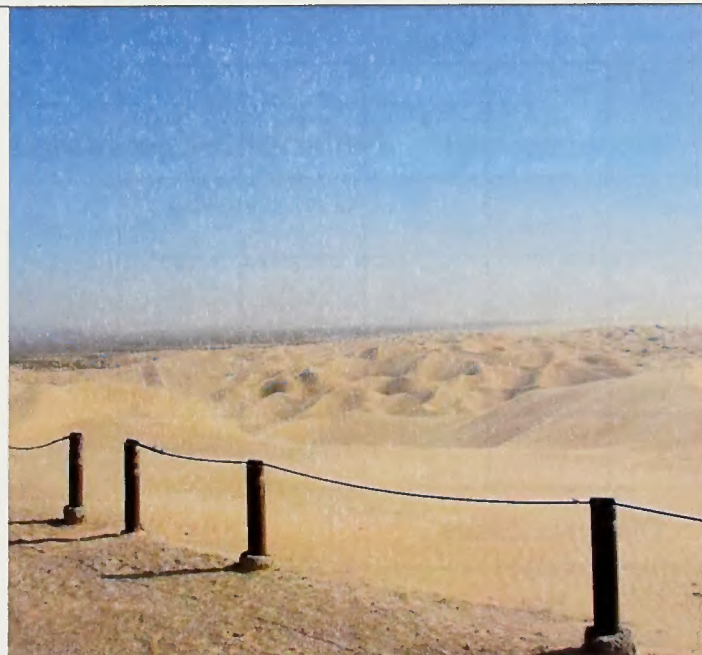
RECON Environmental

- Susy Morales, ISD RAMP/EIS Project Manager, Assistant Visual Analyst
- Lori Woods, Visual Analyst

Also attending and participating in discussions:
Department of Homeland Security, Border Patrol

- Kevin Geller, Public Lands Liaison

Representative Photographs: SQRU-1 Dunes (Large)



VISUAL RESOURCE INVENTORY CLASSIFICATION MATRIX

		Visual Sensitivity Levels						
		High			Medium		Low	
Special Areas		IV✓	I	I	I	I	I	I
Scenic Quality	A	II✓	II	II	II	II	II	II
	B	II	III	III*	III	IV	IV	IV
				IV*				
	C	III	IV	IV	IV	IV	IV	IV
		f/m	b	s/s	f/m	b	s/s	s/s
		Distance Zones						

* If adjacent areas are Class III or lower, assign Class III; if higher, assign Class IV.

Scenic Quality: A
 Sensitivity Level: High
 Distance Zone: Foreground–Middleground
 Inventory Classes: I & II

Class I Management Objective: To **preserve** the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.

Class II Management Objective: To **retain** the existing character of the landscape. The level of change to the characteristic landscape should be low.

Discussion: Class I is assigned to the portion within the North Algodones Dunes Wilderness Area. The Scenic Quality of the SQRU is A, therefore the Inventory Class for the remainder of the SQRU is II, regardless of Visual Sensitivity or Distance Zone. The visual sensitivity level of this area is high due to its recreational use and designation, and because a portion is designated Wilderness (north of SR-78). This area is within foreground–middleground views (i.e., within 3-5 miles) of dune recreationists, viewers on adjacent roads (SR-78), campers, and from aircraft flights heading east to or west from the San Diego area.

Considerations for assigning Management Class: VRM Class I will be assigned to the North Algodones Dunes Wilderness Area in accordance with national BLM policy. Class II would be appropriate for other areas due to the high scenic quality, sensitivity, high visitor use, and expectation for unique, world-class scenery.

United States Department of the Interior Bureau of Land Management Scenic Quality Field Inventory	Field Inventory:	December 2008
	Evaluators:	RECON & BLM
	District:	California Desert District
	Field Office:	El Centro California Field Office
	Resource Area:	Imperial Sand Dunes Recreation Area
	Scenic Quality Rating Unit:	SQRU-2 Small Dunes

Landscape Character: (see representative photos)

	Landform/Water	Vegetation	Structures (General)
Form	Rounded, low dunes with moderate to steep slopes; separated by serpentine valleys between dune hills/mounds; soft lines; random mounds	Minimal vegetative cover; rounded and angular forms. Some variety in vegetation types (form, texture, and pattern)	Minimal structures; rectangular form of bathroom facilities and signs; planar form of roadways and railroad
Line	Rounded, undulating; curvilinear and serpentine waves of sand and flat valleys	Minimal curvilinear branches; rounded canopy; random spacing	Minimal; structures and signs are linear and perpendicular, roadways are relatively straight to slightly curving
Color	Light tans (sand) to very light browns; shadow contrasts; strong contrast with blue skyline	Dark green to olive green; grays minimal. Color of vegetation contrasts greatly with predominantly monochrome sand color	Metalic grays and earthtones of bathrooms and signs; light tans of roadways, dark grays of railroad
Texture	Very fine, even and smooth texture. More course texture within valleys and washes	Medium to coarse	Smooth to moderately course

Narrative / Representative landscape character:

Small dunes rise gently from relatively flat creosote plain, creating a dominant visual element. Small dunes are undulating with valleys meandering between sand mounds. Wavy slopes with rounded to, at times, a sharp angular top edge/crest. The rugged and colorful Chocolate, Cargo Muchacho, and other mountains to the east contrast sharply in form and color, adding visual interest to the area. The higher dunes to the west provide topographic contrast, also adding visual interest. Wavy patterns exist on dune slopes throughout. Valleys and dune bases contain sparse vegetation, and there is little or no vegetation on the dunes. Vegetation density diminishes from edge of small dunes toward larger central dunes; diversity of size and form of vegetation also decreases (smaller plants, lower to ground, toward central dunes). Minimal vegetation present provides a strong contrast with dunes and provides visual interest. Microphyll woodlands adjacent to small dunes (meandering between dunes in places) provide additional visual interest. As with the large dunes, the tan color of the dune sand is generally monochromatic, but there are variations in light and shadow throughout the day and brilliant colors at sunrise and sunset. The small dunes are part of the greater dunes system that is a

regionally significant landscape element of great visual interest. Night-time views in high-use areas during weekends and holidays include lights from numerous recreational vehicles, campfires, and occasionally unauthorized fireworks displays set off by visitors.

Scenic Quality Score & Classification:

	High (4-5)	Medium (3)	Low (1-2)	Total / Rationale	Scenic Quality Classification <input checked="" type="checkbox"/> A (>18) <input type="checkbox"/> B (12-18) <input type="checkbox"/> C (<12)
Landform	4			Unique and dynamic; gently rounded forms	
Vegetation			1	Minimal vegetation evident	
Water			0	No surface water	
Color		3		Monochrome, with shade/shadow contrast during the day; strong contrast with vegetation	
Adjacent Scenery	4			Adjacent large dunes and distant mountains enhance scenic quality	
Scarcity	4			Small dunes are unique to the region, part of larger dune system	
Cultural Modification		3		Few and minor structural elements; do not noticeably detract	
Totals:	12	6	1	19	

Evaluation Team consisted of the following individuals:

BLM El Centro Field Office

- John Johnson, Visual, Recreation, and Wilderness Resources Specialist
- Erin Dreyfuss, RAMP Team Lead, Environmental Protection Specialist
- Neil Hamada, Imperial Sand Dunes Recreation Area Manager

RECON Environmental

- Susy Morales, ISD RAMP/EIS Project Manager, Assistant Visual Analyst
- Lori Woods, Visual Analyst

Also attending and participating in discussions:

Department of Homeland Security, Border Patrol

- Kevin Geller, Public Lands Liaison

Representative Photographs: SQRU-2 Small Dunes



VISUAL RESOURCE INVENTORY CLASSIFICATION MATRIX

		Visual Sensitivity Levels						
		High			Medium		Low	
Special Areas		IV	I	I	I	I	I	I
Scenic Quality	A	II✓	II	II	II	II	II	II
	B	II	III	III*	III	IV	IV	IV
				IV*				
	C	III	IV	IV	IV	IV	IV	IV
		f/m	b	s/s	f/m	b	s/s	s/s
		Distance Zones						

* If adjacent areas are Class III or lower, assign Class III; if higher, assign Class IV.

Scenic Quality: A
 Sensitivity Level: High
 Distance Zone: Foreground–Middleground
 Inventory Classes: I & II

Class I Management Objective: To **preserve** the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.

Class II Management Objective: To **retain** the existing character of the landscape. The level of change to the characteristic landscape should be low.

Discussion: Class I is assigned to the portion within the North Algodones Dunes Wilderness Area. The Scenic Quality of the SQRU is A, therefore the Inventory Class for the remainder of the SQRU is II, regardless of Visual Sensitivity or Distance Zone. The visual sensitivity level of this area is high due to its recreational use and designation. This area is within foreground–middleground views (i.e., within 3-5 miles) of dune recreationists, viewers on adjacent roads (Ted Kipf Road and Wash Road), campers, and from aircraft flights heading east to or west from the San Diego area.

Considerations for assigning Management Class: VRM Class I will be assigned to the portion within the North Algodones Dunes Wilderness Area in accordance with national BLM policy. Class II is appropriate for the other small dunes areas due to the scenic quality, sensitivity, high visitor use, and expectation for unique, world-class scenery.

United States Department of the Interior Bureau of Land Management Scenic Quality Field Inventory	Field Inventory:	December 2008
	Evaluators:	RECON & BLM
	District:	California Desert District
	Field Office:	El Centro California Field Office
	Resource Area:	Imperial Sand Dunes Recreation Area
	Scenic Quality Rating Unit:	SQRU-3 Microphyll Woodlands

Landscape Character: (see representative photos)

	Landform/Water	Vegetation	Structures (General)
Form	Relatively level plain with washes/woodlands dissecting landscape and areas of the small dunes	Rounded and angular forms; higher variety of vegetative forms than surrounding creosote plain and nearby dunes	Few structures within woodlands and surrounding area; planar form of roadways and railroad track, rectangular form of signs and utility poles
Line	Gently curvilinear wash alignments ending at rounded dunes	Rounded to jagged lines of vegetation branches; rounded to angular form of vegetation canopy	Minimal; strong linear pattern of road, railroad tracks; linear and perpendicular form of signs, utility poles, and radio towers
Color	Light tans of dunes, tans and light browns of open areas, some grays	Dark green to olive green; grays minimal, some browns and tans; strong contrast with dunes.	Light tan of road, light to dark gray tones of railroad and signs, tans and browns of poles
Texture	Primarily even texture, relatively fine texture of dunes, medium to coarse texture of plains and washes with rock cobble	Medium to coarse texture; more coarse texture of dead and downed branches throughout woodland	Primarily smooth; coarse rock cobble of railroad track

Narrative / Representative landscape character:

The microphyll woodlands are fingers of higher density vegetation that dissect the primarily sparse creosote plains. The woodlands are primarily within washes flowing from mountains to the east into the small dunes. Increased water availability from storm events and increased soil moisture results in linear vegetation corridors within the washes. The diversity (structure and form) and size of vegetation increases within the woodland/wash fingers. Woodland fingers dissect the eastern small dunes in some areas. The denser vegetation and darker green colors of the microphyll woodlands contrast sharply with the small dunes and add visual interest to the plains. The microphyll woodlands are relatively rare and provide important wildlife habitat for the area.

Scenic Quality Score & Classification:

	High (4-5)	Medium (3)	Low (1-2)	Total / Rationale	Scenic Quality Classification <input checked="" type="checkbox"/> A (>18) <input type="checkbox"/> B (12-18) <input type="checkbox"/> C (<12)
Landform	4			High density vegetation unique to area	
Vegetation	4			Higher diversity and higher density, unique structure	
Water			0	No surface water	
Color		3		Sharp contrast with dunes	
Adjacent Scenery		3			
Scarcity	4			Rare within region	
Cultural Modification			1	Minimal	
Totals:	12	6	1	19	

Evaluation Team consisted of the following individuals:

BLM El Centro Field Office

- John Johnson, Visual, Recreation, and Wilderness Resources Specialist
- Erin Dreyfuss, RAMP Team Lead, Environmental Protection Specialist
- Neil Hamada, Imperial Sand Dunes Recreation Area Manager
-

RECON Environmental

- Susy Morales, ISD RAMP/EIS Project Manager, Assistant Visual Analyst
- Lori Woods, Visual Analyst

Also attending and participating in discussions:
 Department of Homeland Security, Border Patrol

- Kevin Geller, Public Lands Liaison

Representative Photographs: SQRU-3 Microphyll Woodlands



VISUAL RESOURCE INVENTORY CLASSIFICATION MATRIX

		Visual Sensitivity Levels						
		High			Medium		Low	
Special Areas		I✓	I	I	I	I	I	I
Scenic Quality	A	II✓	II	II	II	II	II	II
	B	II	III	III*	III	IV	IV	IV
				IV*				
	C	III	IV	IV	IV	IV	IV	IV
		f/m	b	s/s	f/m	b	s/s	s/s
		Distance Zones						

* If adjacent areas are Class III or lower, assign Class III; if higher, assign Class IV.

Scenic Quality: A
Sensitivity Level: High
Distance Zone: Foreground–Middleground
Inventory Classes: I & II

Class I Management Objective: To **preserve** the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.

Class II Management Objective: To **retain** the existing character of the landscape. The level of change to the characteristic landscape should be low.

Discussion: Class I is assigned to the portion within the North Algodones Dunes Wilderness Area. The Scenic Quality of the SQRU is A, therefore the Inventory Class for the remainder of the SQRU is II, regardless of Visual Sensitivity or Distance Zone. The visual sensitivity level of this area is high due to the unique density and diversity of vegetation. This area is within foreground–middleground views (i.e., within 3-5 miles) of dune recreationists, viewers on adjacent roads (Wash Road), campers, and from aircraft flights heading east to or west from the San Diego area.

Considerations for assigning Management Class: VRM Class I will be assigned to the portion within the North Algodones Dunes Wilderness Area in accordance with national BLM policy. Class II is appropriate for the other microphyll woodlands areas due to the scenic quality, sensitivity, high visitor use in the surrounding areas, and expectation for unique, world-class scenery.

United States Department of the Interior Bureau of Land Management Scenic Quality Field Inventory	Field Inventory:	December 2008
	Evaluators:	RECON & BLM
	District:	California Desert District
	Field Office:	El Centro California Field Office
	Resource Area:	Imperial Sand Dunes Recreation Area
	Scenic Quality Rating Unit:	SQRU-4 Dissected Creosote (Pilot Knob Mesa)

Landscape Character: (see representative photos)

	Landform/Water	Vegetation	Structures (General)
Form	Relatively level plain, dissected by braided and meandering washes	Rounded and angular forms	Few structures; road subgrade in segments
Line	Gently curvilinear wash alignments	Rounded to jagged lines of vegetation	Strong linear patterns of road, railroad, and radio towers
Color	Very light tans (sand) and grays	Light grays and greens of ironwood and smoke trees; darker tones of creosote; seasonal colors of ironwood, palo verde, ocotillo; darker tones of creosote; lavenders, yellows, oranges	Light and dark gray tones
Texture	Even, relatively fine to medium texture (more coarse than adjacent sand dunes); rock cobble more coarse along washes	Medium to coarse texture, lots of dead and downed branches	Smooth

Narrative / Representative landscape character:

Gently sloping plain on east side of dunes with a very sparse distribution of creosote. Area is dissected by washes conveying storm flows from Chocolate and Cargo Muchacho mountains to the dunes. Increased soil moisture results in "fingers" of high density and higher diversity vegetation (much more diversity of structure and forms) within washes.

Scenic Quality Score & Classification:

	High (4-5)	Medium (3)	Low (1-2)	Total / Rationale	Scenic Quality Classification <input type="checkbox"/> A (>18) <input checked="" type="checkbox"/> B (12-18) <input type="checkbox"/> C (<12))
Landform			2		
Vegetation		3			
Water			0	No surface water	
Color			2	Little variety	
Adjacent Scenery	4			Dunes	
Scarcity		3			
Cultural Modification		3		Minimal	
Totals:	4	9	4	17	

Evaluation Team consisted of the following individuals:

BLM EI Centro Field Office

- John Johnson, Visual, Recreation, and Wilderness Resources Specialist
- Erin Dreyfuss, RAMP Team Lead, Environmental Protection Specialist
- Neil Hamada, Recreation Area Manager
-

RECON Environmental

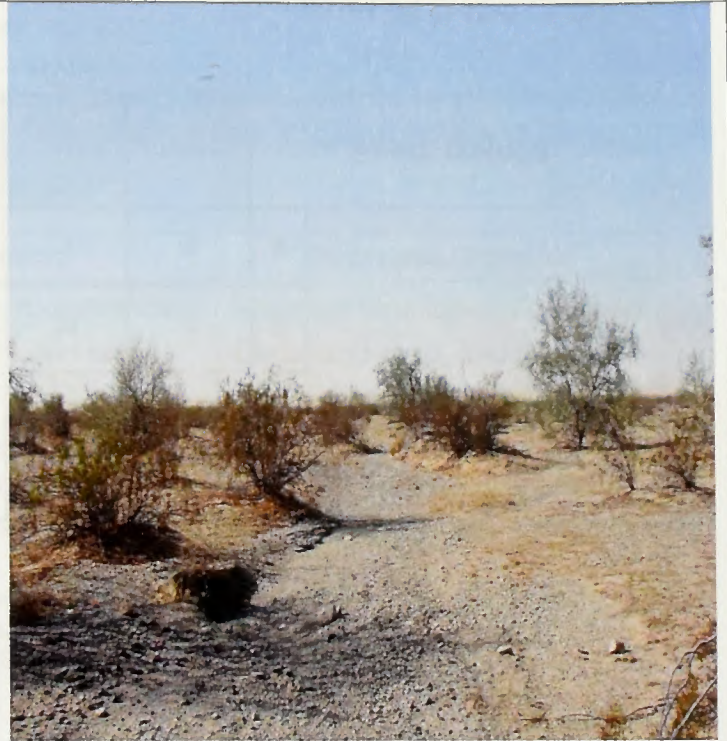
- Susy Morales, ISD RAMP/EIS Project Manager, Visual Analyst Trainee
- Lori Woods, Visual Analyst

Also attending and participating in discussions:

Department of Homeland Security, Border Patrol

- Kevin Geller, Public Lands Liaison

Representative Photographs: SQRU-4 Dissected Creosote (Pilot Knob Mesa)



VISUAL RESOURCE INVENTORY CLASSIFICATION MATRIX

		Visual Sensitivity Levels						
		High			Medium		Low	
Special Areas		I✓	I	I	I	I	I	I
Scenic Quality	A	II	II	II	II	II	II	II
	B	II	III	III*	III✓	IV	IV	IV
				IV*				
	C	III	IV	IV	IV	IV	IV	IV
		f/m	b	s/s	f/m	b	s/s	s/s
		Distance Zones						

* If adjacent areas are Class III or lower, assign Class III; if higher, assign Class IV.

Scenic Quality: B

Sensitivity Level: Medium

Distance Zone: Foreground–Middleground

Inventory Class: I & III

Class I Management Objective: To **preserve** the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.

Class III Management Objective: The objective of this class is to **partially retain** the existing character of the landscape. The level of change to the characteristic landscape should be moderate.

Discussion: Class I is assigned to the portion within the North Algodones Dunes Wilderness Area. Scenic Quality is B and the Inventory Class for the remainder of the SQRU is III due to the distance zone and visual sensitivity level (adjacent to the dunes). Many areas within this unit have high visitor use from OHV recreationists camping and riding to the adjacent dunes. Visitor use is high during holidays and some weekends. This unit contains few special areas, but is located adjacent to several special management areas such as the North Algodones Dunes Wilderness and the larger dunes areas. This area is within foreground–middleground views (i.e., within 3-5 miles) of dune recreationists, campers, adjacent roadways, and from aircraft flights heading east to and west from the San Diego area.

Considerations for assigning Management Class: VRM Class I will be assigned to portion within the North Algodones Dunes Wilderness Area in accordance with national BLM policy. Class III is appropriate for the remainder of the dissected creosote scrub unit due to the lower scenic quality of the area as compared to the adjacent dunes, lower visual sensitivity overall, high visitor use, and type of visitor use.

United States Department of the Interior Bureau of Land Management Scenic Quality Field Inventory	Field Inventory:	December 2008
	Evaluators:	RECON & BLM
	District:	California Desert District
	Field Office:	El Centro California Field Office
	Resource Area:	Imperial Sand Dunes Recreation Area
	Scenic Quality Rating Unit:	SQRU-5 Creosote Flats (west side, including East Mesa)

Landscape Character: (see representative photos)

	Landform/Water	Vegetation	Structures (General)
Form	Relatively level, gentle gradient east to west	Few small trees; rounded low forms of creosote and small shrubs	Very few structures; Coachella Canal and road, and dunes roads
Line	Mostly flat, straight line of ground plane	Short (<6') vertical lines of creosote branches and small shrubs	Linear pattern of canal, roads and power lines and towers in the distance
Color	Tans and light grays of sand and ground surface	Dark greens, grays of creosote leaves and branches; seasonal color of verbena (purples)	Most appear dark grays; blue/green water in canal
Texture	Even, relatively fine to medium texture (more coarse than adjacent sand dunes)	Even, fine-textured from a distance; coarser texture	Smooth

Narrative / Representative landscape character:

Gently sloping plain on west side of large dunes, with a relatively even and low-to-moderate density and distribution of creosote. Area is mostly lacking in trees and ocotillo. Unit is dissected by New Coachella Canal and roadway. Few structures are present.

Scenic Quality Score & Classification:

	High (4-5)	Medium (3)	Low (1-2)	Total / Rationale	Scenic Quality Classification <input type="checkbox"/> A (>18) <input checked="" type="checkbox"/> B (12-18) <input type="checkbox"/> C (<12)
Landform			1	Relatively flat topography	
Vegetation			2	Creosote habitat	
Water			1	Canal	
Color			2	Little variety	
Adjacent Scenery	4			Backdrop of dunes on east	
Scarcity			1	Not regionally scarce	
Cultural Modification		3		Minimal	
Totals:	4	3	7	14	

Evaluation Team consisted of the following individuals:

BLM EI Centro Field Office

- John Johnson, Visual, Recreation, and Wilderness Resources Specialist
- Erin Dreyfuss, RAMP Team Lead, Environmental Protection Specialist
- Neil Hamada, Imperial Sand Dunes Recreation Area Manager
-

RECON Environmental

- Susy Morales, ISD RAMP/EIS Project Manager, Assistant Visual Analyst
- Lori Woods, Visual Analyst

Also attending and participating in discussions:

Department of Homeland Security, Border Patrol

- Kevin Geller, Public Lands Liaison

Representative Photographs: SQRU-5 Creosote Flats

(west side, including East Mesa)



VISUAL RESOURCE INVENTORY CLASSIFICATION MATRIX

		Visual Sensitivity Levels						
		High			Medium		Low	
Special Areas		I✓	I	I	I	I	I	I
Scenic Quality	A	II	II	II	II	II	II	II
	B	II	III	III*	III✓	IV	IV	IV
				IV*				
	C	III	IV	IV	IV	IV	IV	IV
		f/m	b	s/s	f/m	b	s/s	s/s
		Distance Zones						

* If adjacent areas are Class III or lower, assign Class III; if higher, assign Class IV.

Scenic Quality: B

Sensitivity Level: Medium

Distance Zone: Foreground–Middleground

Inventory Class: I & III

Class I Management Objective: To **preserve** the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.

Class III Management Objective: The objective of this class is to **partially retain** the existing character of the landscape. The level of change to the characteristics landscape should be moderate.

Discussion: Class I is assigned to the portion within the North Algodones Dunes Wilderness Area. The Scenic Quality of the SQRU is B and the Inventory Class for the remainder of the area is III due to the distance zone and visual sensitivity level (adjacent to the dunes). Many areas of this unit have high visitor use from OHV recreationists camping and riding to the adjacent dunes. Visitor use is high during holidays and some weekends. This unit contains few special areas, but is located adjacent to the dunes special management area. This area is within foreground–middleground views (i.e., within 3-5 miles) of dune recreationists, campers, adjacent roadways, and from aircraft flights heading east to and west from the San Diego area.

Considerations for assigning Management Class: VRM Class I will be assigned to the portion within the North Algodones Dunes Wilderness Area in accordance with national BLM policy. Class III is appropriate for the remainder of the creosote flats unit due to the lower scenic quality of the area as compared to the adjacent dunes, lower visual sensitivity overall, high visitor use, and type of visitor use.

United States Department of the Interior Bureau of Land Management Scenic Quality Field Inventory	Field Inventory:	December 2008
	Evaluators:	RECON & BLM
	District:	California Desert District
	Field Office:	El Centro California Field Office
	Resource Area:	Imperial Sand Dunes Recreation Area
	Scenic Quality Rating Unit:	SQRU-6 High-use Areas

Landscape Character: (see representative photos)

	Landform/Water	Vegetation	Structures (General)
Form	Relatively level areas	Few small trees or shrubs; rounded and irregular forms	Linear form of roadways, rectangular of power lines, towers, bathroom facilities, and signs
Line	Mostly flat areas	Vertical lines of trees, rounded line of creosote and small shrubs	Linear pattern of road, power lines and towers
Color	Tans and light grays of sand and ground surface, grays of roads and structures	Dark greens, grays of creosote leaves and branches; seasonal color of verbena (purples)	Metallic grays, rust color and earth tones; dark grays of paved roads; grays and blacks of bathroom facilities
Texture	Even, relatively fine to medium texture of dunes areas; more course texture of plains and trails/tracks	Even, fine-textured from a distance; coarser texture	Smooth to moderately course

Narrative / Representative landscape character:

High-use areas are located off of roadways within the Planning Area (south of SR-78, north and south of I-8, Ted Kopf Road, Ogilby Road). High-use areas are primarily located in relatively flat plains either within the dunes or creosote scrub mesas. The majority of campers concentrate within these high-use areas, particularly during holidays and weekends when thousands of visitors recreate in the dunes. Cultural modification of the high-use areas consists of roadways (some paved), bathroom facilities, signs and kiosks, and vendor areas. Two ranger stations are located near highest use areas. Modifications to the landscape generally contrast with the high scenic quality of surrounding dunes.

Scenic Quality Score & Classification:

	High (4-5)	Medium (3)	Low (1-2)	Total / Rationale	Scenic Quality Classification <input type="checkbox"/> A (>18) <input type="checkbox"/> B (12-18) <input checked="" type="checkbox"/> C (<12)
Landform			1	Relatively flat topography	
Vegetation			2	Minimal in most areas	
Water			0	None	
Color			2	Little variety	
Adjacent Scenery	4			Backdrop of dunes	
Scarcity			1		
Cultural Modification			-1		
Totals:	4		5	9	

Evaluation Team consisted of the following individuals:

BLM El Centro Field Office

- John Johnson, Visual, Recreation, and Wilderness Resources Specialist
- Erin Dreyfuss, RAMP Team Lead, Environmental Protection Specialist
- Neil Hamada, Imperial Sand Dunes Recreation Area Manager

RECON Environmental

- Susy Morales, ISD RAMP/EIS Project Manager, Assistant Visual Analyst
- Lori Woods, Visual Analyst

Also attending and participating in discussions:

Department of Homeland Security, Border Patrol

- Kevin Geller, Public Lands Liaison

Representative Photographs:



VISUAL RESOURCE INVENTORY CLASSIFICATION MATRIX

		Visual Sensitivity Levels						
		High			Medium		Low	
Special Areas		I	I	I	I	I	I	I
Scenic Quality	A	II	II	II	II	II	II	II
	B	II	III	III*	III	IV	IV	IV
				IV*				
	C	III	IV	IV	IV✓	IV	IV	IV
		f/m	b	s/s	f/m	b	s/s	s/s
		Distance Zones						

* If adjacent areas are Class III or lower, assign Class III; if higher, assign Class IV.

Scenic Quality: C
Sensitivity Level: Medium
Distance Zone: Foreground-Middleground
Inventory Class: IV

Class IV Management Objective: The objective of this class is to provide for management activities which require major modifications of the existing character of the landscape

Discussion: Scenic Quality is C and the Inventory Class for the area is IV due to the distance zone and medium visual sensitivity level. These areas have high visitor use from OHV recreationists camping and riding to the adjacent dunes, as well as vendors. Visitor use is high during holidays and many weekends. The high-use areas are located either within the dunes (campgrounds off of Gecko Road) or adjacent to the dunes. High-use areas are within foreground-middleground views (i.e., within 3-5 miles) of dune recreationists (OHV riders), adjacent roadways, and from aircraft flights heading east to and west from the San Diego area.

Considerations for assigning Management Class: Class IV is appropriate for the high use units due to the lower scenic quality of these areas as compared to the adjacent dunes, lower visual sensitivity overall, very high visitor use, and type of visitor use (camping, vendors, and recreational use).

United States Department of the Interior Bureau of Land Management Scenic Quality Field Inventory	Field Inventory:	December 2008
	Evaluators:	RECON & BLM
	District:	California Desert District
	Field Office:	El Centro California Field Office
	Resource Area:	Imperial Sand Dunes Recreation Area
	Scenic Quality Rating Unit:	SQRU-7 Interstate 8 Corridor

Landscape Character: (see representative photos)

	Landform/Water	Vegetation	Structures (General)
Form	Relatively level plain/corridor	Few small trees or shrubs; rounded and irregular forms	Linear form of roadway, rectangular form of power lines, towers, roadside facilities, and signs
Line	Mostly flat area	Vertical lines of trees, rounded line of creosote and small shrubs	Linear pattern of roadway, vertical power lines and towers
Color	Tans and light grays of sand and ground surface, light to dark grays of roadway and structures; browns of some utility poles	Dark to light greens of trees and shrubs within corridor	Metallic grays, rust color and earth tones; dark grays of paved roads; grays and blacks of facilities
Texture	Course texture of roadway and trails/tracks, smooth texture of sandy areas	Even, fine-textured from a distance; coarser texture in some areas	Smooth to moderately course

Narrative / Representative landscape character:

The I-8 corridor is a very high use area containing a split 4-lane highway, frontage roads, above- and below-ground utility lines, a rest area, and portions of the All-American Canal. There are also several campgrounds within or adjacent to the corridor. Vegetation within the corridor is minimal, consisting primarily of creosote scrub. The dunes are visible from the corridor, adding visual interest. The recently completed International Boundary fence (consisting of approximately 15-foot-high steel fence lines) is highly visible along some portions of the corridor. During high-use periods, hundreds of recreational vehicles (campers and OHVs) may be seen adjacent to the corridor.

Scenic Quality Score & Classification:

	High (4-5)	Medium (3)	Low (1-2)	Total / Rationale	Scenic Quality Classification <input type="checkbox"/> A (>18) <input type="checkbox"/> B (12-18) <input checked="" type="checkbox"/> C (<12)
Landform			1	Relatively flat topography	
Vegetation			2	Minimal in most areas	
Water			1	Canal	
Color			2	Little variety overall	
Adjacent Scenery	4			Backdrop of dunes	
Scarcity			1		
Cultural Modification			-2		
Totals:	4		5	9	

Evaluation Team consisted of the following individuals:

BLM El Centro Field Office

- John Johnson, Visual, Recreation, and Wilderness Resources Specialist
- Erin Dreyfuss, RAMP Team Lead, Environmental Protection Specialist
- Neil Hamada, Imperial Sand Dunes Recreation Area Manager

RECON Environmental

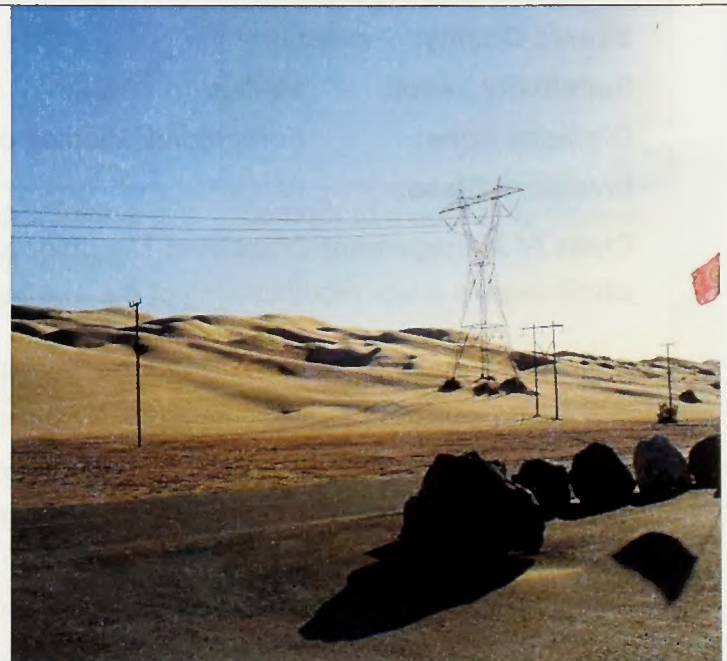
- Susy Morales, ISD RAMP/EIS Project Manager, Assistant Visual Analyst
- Lori Woods, Visual Analyst

Also attending and participating in discussions:

Department of Homeland Security, Border Patrol

- Kevin Geller, Public Lands Liaison

Representative Photographs:



VISUAL RESOURCE INVENTORY CLASSIFICATION MATRIX

		Visual Sensitivity Levels						
		High			Medium		Low	
Special Areas		I	I	I	I	I	I	I
Scenic Quality	A	II	II	II	II	II	II	II
	B	II	III	III*	III	IV	IV	IV
				IV*				
	C	III	IV	IV	IV✓	IV	IV	IV
		f/m	b	s/s	f/m	b	s/s	s/s
		Distance Zones						

* If adjacent areas are Class III or lower, assign Class III; if higher, assign Class IV.

Scenic Quality: C
Sensitivity Level: Medium
Distance Zone: Foreground–Middleground
Inventory Class: IV

Class IV Management Objective: The objective of this class is to provide for management activities which require major modifications of the existing character of the landscape.

Discussion: Scenic Quality is C and the Inventory Class for the area is IV due to the distance zone and medium visual sensitivity level. These areas have high visitor use from OHV recreationists camping and riding to the adjacent dunes, as well as vendors. Visitor use is high during holidays and many weekends. The corridor has relatively high volumes of interstate traffic and contains several above- and below-ground utility lines. High-use areas are within foreground–middleground views (i.e., within 3-5 miles) of dune recreationists (OHV riders), adjacent roadways, and from aircraft flights heading east to, and west from the San Diego area.

Considerations for assigning Management Class: Class IV is appropriate for the I-8 corridor due to the lower scenic quality as compared to the adjacent dunes, lower visual sensitivity overall, very high visitor use, and type of visitor use (interstate travel, camping, vendors, and recreational use).

United States Department of the Interior Bureau of Land Management Scenic Quality Field Inventory	Field Inventory:	December 2008
	Evaluators:	RECON & BLM
	District:	California Desert District
	Field Office:	El Centro California Field Office
	Resource Area:	Imperial Sand Dunes Recreation Area
	Scenic Quality Rating Unit:	SQRU-8 Agricultural Area

Landscape Character: (see representative photos)

	Landform/Water	Vegetation	Structures (General)
Form	Level plain	Rounded form of orchard tree canopies and linear form of trunks; linear, regular spacing	Linear form of roadways within fields and canal (Coachella), rectangular form of power lines and structures (few)
Line	Mostly flat area	Vertical lines of trees, rounded line of tree canopies	Linear pattern of roadways, vertical power lines
Color	Tans and light grays of sandy areas and ground surface, light tan of roadways; browns of tree trunks	Mostly dark green trees	Tans and grays of the few structures
Texture	Course texture of roadway and trails/tracks	Even, fine-textured from a distance; coarser texture closer to orchards	Smooth to moderately course

Narrative / Representative landscape character:

The agricultural area located in the northern portion of the ISDRA consists primarily of orchard trees. Trees are evenly spaced within blocks, with access roads between and surrounding orchard blocks. Blocks seem to be arranged at an angle to the dunes located to the east. Dark green of tree canopies contrasts strongly with the light tans of the dunes. A large wash (Mammoth Wash) dissects the central portion of the orchard blocks from northeast to southwest. The Coachella Canal dissects the orchards from south to north.

Scenic Quality Score & Classification:

	High (4-5)	Medium (3)	Low (1-2)	Total / Rationale	Scenic Quality Classification <input type="checkbox"/> A (>18) <input type="checkbox"/> B (12-18) <input checked="" type="checkbox"/> C (<12)
Landform			1	Relatively flat topography	
Vegetation			2	No native vegetation, orchard trees	
Water			1	Canal	
Color			2		
Adjacent Scenery	3			Backdrop of dunes	
Scarcity			1		
Cultural Modification			-2		
Totals:	3		5	8	

Evaluation Team consisted of the following individuals:

BLM El Centro Field Office

- John Johnson, Visual, Recreation, and Wilderness Resources Specialist
- Erin Dreyfuss, RAMP Team Lead, Environmental Protection Specialist
- Neil Hamada, Imperial Sand Dunes Recreation Area Manager
-

RECON Environmental

- Susy Morales, ISD RAMP/EIS Project Manager, Assistant Visual Analyst
- Lori Woods, Visual Analyst

Also attending and participating in discussions:

Department of Homeland Security, Border Patrol

- Kevin Geller, Public Lands Liaison

Representative Photographs:

VISUAL RESOURCE INVENTORY CLASSIFICATION MATRIX

		Visual Sensitivity Levels						
		High			Medium		Low	
Special Areas		I	I	I	I	I	I	I
Scenic Quality	A	II	II	II	II	II	II	II
	B	II	III	III*	III	IV	IV	IV
				IV*				
	C	III	IV	IV	IV✓	IV	IV	IV
		f/m	b	s/s	f/m	b	s/s	s/s
		Distance Zones						

* If adjacent areas are Class III or lower, assign Class III; if higher, assign Class IV.

Scenic Quality: C
Sensitivity Level: Medium
Distance Zone: Foreground–Middleground
Inventory Class: IV

Class IV Management Objective: The objective of this class is to provide for management activities which require major modifications of the existing character of the landscape.

Discussion: Scenic Quality is C and the Inventory Class for the area is IV due to the distance zone and medium visual sensitivity level. The agricultural areas have a very high level of cultural modification (planting of orchard trees, ongoing maintenance and harvesting, existence of roads). Recreationists camp and ride OHVs east of the agricultural fields; however, use is lower in this area as opposed to areas south of SR-78. The agricultural area is within foreground–middleground views (i.e., within 3-5 miles) of campers, dune recreationists (OHV riders), adjacent roadways, and from aircraft flights heading east to and west from the San Diego area.

Considerations for assigning Management Class: Class IV is appropriate for the Agricultural Area due to the lower scenic quality as compared to the adjacent dunes, lower visual sensitivity overall, visitor use in the surrounding area, and type of visitor use.

Authorized Land Uses/Status

SRMA

1. Cathodic Protection Unit Site R/W (LA 0155193)
2. BLM Windmill and Weather Water Tank Sites (2) R/W (CA-6714)
3. BLM Windmill and Weather Water Tank Site R/W (CA-6714)
4. State Highway 78 R/W (CA-14573)
5. Contaminated Military Area—Surface Use Only (R 05657)
6. Contaminated Military Area—Surface Use Only (R 05657)
7. Old Coachella Canal R/W (LA 0155193)
8. Withdrawal Yuma Reclamation Project—New (Reassigned) Coachella Canal
9. BLM (Gadsden Road) Easement (CA-2551)
10. Glendon Knapp Geothermal Resource Area (CA-17572)
11. Fiber Optic Line (AT&T) R/W (CA-41690)
12. Underground Telephone Line R/W (CA-19125)
13. Temporary Use Permits for Apert Sites along Coachella Canal
14. Underground Telephone Line R/W (CA-19125)
15. Road R/W (CA-40791)
16. State Highway 78 (Reassigned portion) R/W (CA-17522)
17. Fiber Optic Line (AT&T) R/W (CA-41690)
18. Contaminated Military Area—Surface Use Only (R 05657)
19. Cathodic Protection Unit Site R/W (LA 0155193)
20. Glendon Knapp Geothermal Resource Area (CA-17572)

APPENDIX L

APPENDIX A: INVENTORY CLASSIFICATION MATRIX

	Visual Sensitivity Levels					
	High		Medium		Low	
High Sensitivity	I	II	III	IV	V	VI
Medium Sensitivity	I	II	III	IV	V	VI
Low Sensitivity	I	II	III	IV	V	VI

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APPENDIX B

Survey Quality: ☐
 Sensitivity Level: ☐
 Distance Zone: ☐
 Inventory Class: ☐

Class IV Management Objective: The objective of this class is to provide for management activities which require more consideration of resources, character of the landscape.

Discussion: Survey Quality is C and the Inventory Class for this area is IV due to the distance zone and medium visual sensitivity level. The agricultural area has a very high level of cultural modification (planting of various crops, regular maintenance and harvesting, existence of roads). Recreation is high and the area is used for agricultural and other purposes. Use is lower in this area as compared to other areas in the area. The agricultural area is within foreground-midground view zone, within full view of various, distant resources (city center), adjacent roadways, and from various flight headings and is not seen from the San Diego area.

Considerations for assigning Management Class: Class IV is appropriate for the Agricultural Area due to the lower survey quality as compared to the adjacent areas. More visual sensitivity overall, which is not the surrounding area, and type of other area.

Authorized Land Uses/Status

SRMA

1. Cathodic Protection Unit Site R/W (LA 0158160)
2. BLM Windmill and Wildlife Water Tank Sites (2) R/W (CA-8714)
3. BLM Windmill and Wildlife Water Tank Site R/W (CA-8714)
4. State Highway 78 R/W (CA-14630)
5. Contaminated Military Area—Surface Use Only (R 05657)
6. Contaminated Military Area—Surface Use Only (R 05657)
7. Old Coachella Canal R/W (LA 056654)
8. Withdrawal Yuma Reclamation Project—New (Realigned) Coachella Canal
9. BLM (Gecko Road) Easement (CA-2551)
10. Glamis Known Geothermal Resource Area (CA-17575)
11. Fiber Optic Line (AT&T) R/W (CA-41690)
12. Underground Telephone Line R/W (CA-19125)
13. Temporary Use Permits for Apiary Sites along Coachella Canal
14. Underground Telephone Line R/W (CA-19125)
15. Road R/W (CA-40791)
16. State Highway 78 (Realigned portion) R/W (CA-17922)
17. Fiber Optic Line (AT&T) R/W (CA-41690)
18. Contaminated Military Area—Surface Use Only (R 05657)
19. Cathodic Protection Unit Site R/W (LA 0158161)
20. Glamis Known Geothermal Resource Area (CA-17572)

21. All-American Canal R/W (LA 077775)
22. Proposed Withdrawal, All American Canal Lining Project (CA-34475)
23. Old Coachella Canal R/W (LA 056654)
24. Withdrawal Yuma Reclamation Project—New (Realigned) Coachella Canal
25. Contaminated Military Area—Surface Use Only (R 05657)
26. Temporary Use Permits for Apiary Sites along Coachella Canal
27. Interstate 8 Highway R/W (LA 0165008)
28. State Highway (Grays Well Overpass) R/W (CA-17911)
29. Transmission Line R/W (LA 055613)
30. Transmission Line R/W (CA-5865)
31. County Road (Ogilby) R/W (CA-19171)
32. Communication Site, Access Road and Transmission Line R/W (CA-17182)
33. Railroad R/W (east boundary of management area)
34. All-American Canal and Well Sites R/W (LA 077775)
35. Proposed Withdrawal, All American Canal Lining Project (CA-34475)
36. Utility Corridor J (2 miles wide)
37. All-American Canal and Associated Telephone and Transmission Line R/W (LA 077775)
38. Transmission Line R/W (CA-5865)
39. Transmission Line R/W (CA-18904)
40. Transmission Line R/W (LA 055165)
41. Transmission Line R/W (LA 0164553)
42. Powerline Extension (to All-American Canal) R/W (CA-35934)
43. Underground Telephone Line R/W (CA-26357)

44. Underground Fiber Optic Line (Level 3) R/W (CA-41192)
45. Barrier (USBP) R/W Reservation (CA-34052)
46. Road (Grays Well Road) R/W Reservation to BLM (CA-19131)
47. Interstate 8 Highway R/W (LA 0165008)
48. State Highway (Grays Well Overpass) R/W (CA-17911)
49. Interstate 8 Highway and Ancillary Facilities R/W (R 07237)
50. Interstate 8 Highway and Ancillary Facilities R/W (R 01737)
51. Proposed Withdrawal, All-American Canal Lining Project (CA-34475)

ERMA

1. Strip of Land Acquired by and Under Jurisdiction of BOR (CA-19902)
2. Old Coachella Canal R/W (LA 056654)
3. Underground Fiber Optic Line (AT&T) R/W (CA-41690)
4. Cathodic Protection Unit Site R/W (LA 0158162)
5. State Highway 78 (Realigned Portion) R/W (CA-17922)
6. Railroad Spur R/W (CA-29617)
7. Mineral Material Site (LA 0164722)
8. Cathodic Protection Unit Site R/W (R-374)
9. Easement to US for Gordons Well Road (CA-37234)
10. Barrier (USBP) R/W Reservation (CA-34052)
11. County Road (Old Highway 80) R/W (R 01737)
12. Underground Telephone Line R/W (CA-26357)
13. Road R/W (LA 0165008)
14. All-American Canal, Telephone Line R/W (LA 077775)
15. Transmission Line R/W (LA 055165)

16. Transmission Line R/W (LA 164553)
17. County Road (Old Highway 80) R/W (R 01737)
18. Road, Pipeline, Wells, Transmission Line (CA-21618)
19. Mineral Material Site (LA 0133909)
20. RS 2477 County Road (Vista Mine Road and Zappone Road) R/W (CA-19169)
21. State Highway (Portion of Highway 78) R/W (CA-14630)
22. Underground Telephone Line R/W (CA-19125)
23. Road R/W (CA-8503)
24. Road R/W (CA-40791)
25. All-American Canal R/W (LA 077775)
26. Seismographic Monitoring Site R/W (CA-2953-22)
27. Transmission Line R/W (CA-5865)
28. Underground Fiber Optic Line (Level 3) R/W (CA-41192)
29. State Highway R/W (R 137)
30. Surveillance Camera and Access Road (USBP) R/W Reservation (CA-40000)
31. Telephone Line and Road R/W (CA-18904)
32. Temporary Use Permits for Apiary Sites along Coachella Canal
33. Mining Claim, Sage Placer (CAMC-285194; T. 15 S., R. 20 E., sec. 27)

Rights-of-Way

T. 11 S., R. 15 E., secs. 29-33 inclusive.

1. Sempre Generation, (Solar-PENDING), CACA 50113
2. Imperial Irrigation District, (Irrigation Project), CALA 025732

T. 12 S., R. 15 E., secs. 2 and 12.

1. Imperial Irrigation District, (Irrigation Project), CALA 025732
2. Imperial Irrigation District, (Irrigation Project), CALA 025732

APPENDIX M

T. 12 S., R. 16 E., secs. 3-4 inclusive, 13-15 inclusive, 17-23 inclusive, and 32-35 inclusive.

1. BLM California Desert District Office, (Windmill Water tank), CACA 8714
2. Sempre Generation, (Solar-PENDING), CACA 50113
3. Imperial Irrigation District, (Irrigation Project), CALA 025732
4. Bureau of Reclamation, (Power Transfer Project, 30-32 mi.), CALA 056954
5. Santa Fe Pacific PPSM, LLC, (Telephone Line, 1200 D.R.), CALA 0156150

T. 13 S., R. 17 E., secs. 1-15 inclusive, 20-25 inclusive, and 33-35 inclusive.

1. BLM El Centro Field Office, (Easement, 5061 D.R., ACQUIRED), CACA 510-01
2. BLM California Desert District Office, (Windmill Water tank), CACA 8714
3. California Department of Transportation, (Federal Highway 78, unknown m.), CACA 14030
4. SBC Pacific Bell, (Underground Telephone Line, 10.75 mi.), CACA 19125

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APPENDIX M

Rights-of-Way

T. 11 S., R. 16 E., secs. 29-33 inclusive.

1. Sempra Generation, (Solar-PENDING), CACA 50113
2. Imperial Irrigation District, (Irrigation Project), CALA 039762

T. 12 S., R. 15 E., secs. 2 and 12.

1. Imperial Irrigation District, (Power Line, 500 ft.), CACA 19166
2. Imperial Irrigation District, (Irrigation Project), CALA 039762

T. 12 S., R. 16 E., secs. 3-6 inclusive, 8-11 inclusive, 13-15 inclusive, 17-29 inclusive, and 32-35 inclusive.

1. BLM California Desert District Office, (Windmill Water tank), CACA 8714
2. Sempra Generation, (Solar-PENDING), CACA 50113
3. Imperial Irrigation District, (Irrigation Project), CALA 039762
4. Bureau of Reclamation, (Power Trans/Irr Project, 33.37mi.), CALA 056654
5. Santa Fe Pacific PPLN, LLC, (Telephone Line, 1288.0 ft.), CALA 0158160

T. 13 S., R. 17 E., secs. 1-18 inclusive, 20-28 inclusive, and 33-36 inclusive.

1. BLM El Centro Field Office, (Easement, 5661.0 ft, ACQUIRED), CACA 610-01
2. BLM California Desert District Office, (Windmill Water tank), CACA 8714
3. California Department of Transportation, (Federal Highway 78, unknown mi.), CACA 14630
4. SBC Pacific Bell, (Underground Telephone Line, 10.75 mi.), CACA 19125

5. MCI Telecom Corp., (Road, 145.0 ft.), CACA 27170
6. AT&T Lease Administration, (Fiber Optic Cable, 15.75 mi.), CACA 41690
7. AT&T Lease Administration, (Temporary Constr. Area, 15.75 mi.), CACA 41690-01
8. Imperial Irrigation District, (Irrigation Project), CALA 039762
9. Bureau of Reclamation, (Power Trans/Irr Project, 33.37mi.), CALA 056654

T. 13 S., R. 17½ E., secs. 25-27 inclusive and 34-36 inclusive.

1. California Department of Transportation, (Federal Highway 78, unknown mi.), CACA 14630
2. SBC Pacific Bell, (Underground Telephone Line, 10.75 mi.), CACA 19125
3. AT&T Lease Administration, (Fiber Optic Cable, 15.75 mi.), CACA 41690
4. AT&T Lease Administration, (Temporary Constr. Area, 15.75 mi.), CACA 41690-01

T. 13 S., R. 18 E., secs. 17, 20-23 inclusive, and 25-35 inclusive.

1. Imperial County, (Road, 1800.0 ft), CACA 8503
2. California Department of Transportation, (Federal Highway 78, unknown mi.), CACA 14630
3. California Department of Transportation and Federal Highway Administration, (Federal Highway 78, unknown mi.), CACA 17922
4. SBC Pacific Bell, (Underground Telephone Line, 10.75 mi.), CACA 19125
5. Marine Corps Air Station, (Mobile Radar Communication Site, Chocolate Mountains), CACA 19167
6. California Department of Transportation, (Road, 8.0 mi.), CACA 20249
7. La County Sanitation DI #2, (Railroad Spur, 4-5 mi.), CACA 29617
8. Santa Fe Pacific PPLN, LLC, (Fiber Optic Cable, 1.5 mi.), CACA 40610

9. Craig and Jacqueline Jones, (Road, 5091.0 ft.), CACA 40791
10. AT&T Lease Administration, (Fiber Optic Cable, 15.75 mi.), CACA 41690
11. AT&T Lease Administration, (Temporary Constr. Area, 15.75 mi.), CACA 41690-01
12. Santa Fe Pacific PPLN, LLC, (Fiber Optic Cable, 909.0 ft.), CALA 0158162

T. 14 S., R. 17 E., secs. 1-3 inclusive, 11-14 inclusive, and 23-25 inclusive.

1. BLM California Desert District Office, (Gecko Road, 2.5 mi.), CACA 2551
2. California Department of Transportation, (Federal Highway 78, unknown mi.), CACA 14630
3. SBC Pacific Bell, (Underground Telephone Line, 10.75 mi.), CACA 19125
4. AT&T Lease Administration, (Fiber Optic Cable, 15.75 mi.), CACA 41690
5. AT&T Lease Administration, (Temporary Constr. Area, 15.75 mi.), CACA 41690-01
6. Imperial Irrigation District, (Irrigation Project), CALA 039762
7. Bureau of Reclamation, (Power Trans/Irr Project, 33.37 mi.), CALA 056654

T. 14 S., R. 18 E., secs. All.

1. BLM California Desert District Office, (Gecko Road, 2.5 mi.), CACA 2551
2. California Department of Transportation, (Federal Highway 78, unknown mi.), CACA 14630
3. Imperial Irrigation District, (Irrigation Project), CALA 039762
4. Bureau of Reclamation, (Power Trans/Irr Project, 33.37 mi.), CALA 056654

T. 14 S., R. 19 E., secs. 6-7 inclusive, 17-22 inclusive, and 26-35 inclusive.

1. U.S. Border Patrol, (Federal Facility), CACA 9494
2. Imperial County, (RS 2477 Road, 9.65 mi.), CACA 19169
3. Pacific Solar Investments, (Solar-PENDING), CACA 49615

T. 15 S., R. 18 E., secs. 1-15 inclusive, 17, 21-27 inclusive, and 34-35 inclusive.

1. USGS, (Earthquake Detection-Coachella), CACA 0295322
2. Imperial Irrigation District, (Irrigation Project), CALA 039762
3. Bureau of Reclamation, (Power Trans/Irr Project, 33.37 mi.), CALA 056654

T. 15 S., R. 19 E., secs. 1-15 inclusive and 17-60 inclusive.

1. Pacific Solar Investments, (Solar-PENDING), CACA 49615
2. Imperial Irrigation District, (Irrigation Project), CALA 039762
3. Bureau of Reclamation, (Power Trans/Irr Project, 33.37 mi.), CALA 056654
4. Santa Fe Pacific PPLN, LLC, (Cathodic Protection Site), CARI 374

T. 15 S., R. 20 E., secs. 6-9 inclusive, 17-23 inclusive, and 25-35 inclusive.

1. Western Wireless, (Communication Site-Ogilby, transmission line, and access road-30 ft. x 2671.68 ft.), CACA 17182
2. Imperial County, (RS 2477 Road, Ogilby Road, unknown mi.), CACA 19171
3. American Girl Mining, (Underground Water Pipelines, Power Lines, and 2 Well Sites, 7920.0 ft.), CACA 21618
4. North Baja PPLN, LLC, (O&G Pipeline, 30 in., and related facilities, 7.84 mi.), CACA 42662

5. Pacific Solar Investments, (Solar-PENDING), CACA 49615
6. Imperial Irrigation District, (Irrigation Project), CALA 039762
7. California Dept of Transportation, (Material Site), CALA 0133486
8. California Dept of Transportation, (Material Site), CALA 0133909
9. Santa Fe Pacific PPLN, LLC, (Cathodic Protection Site), CALA 0158161

T. 16 S., R. 18 E., sec. 1.

1. Imperial Irrigation District, (Irrigation Project), CALA 039762

T. 16 S., R. 19 E., secs. 1-6 inclusive, 8-15 inclusive, 23-26 inclusive, and 35.

1. Agri Analytics, Inc., (Road, 2910.0 ft.) CACA 6669
2. Imperial Irrigation District, (Transmission Line and Telephone Line, 8.72 mi.), CACA 18904
3. Imperial Irrigation District, (Irrigation Project), CALA 039762
4. Bureau of Reclamation, (Power Trans/Irr Project, 33.37 mi.), CALA 056654
5. California Dept of Transportation, (Federal Highway, unknown mi), CARL 01737

T. 16 S., R. 20 E., secs. All.

1. San Diego Gas & Electric Co., (Power Line, 500kV, 82.50 mi.), CACA 5865
2. California Dept of Transportation and Federal Highway Administration, (Freeway Interchange, unknown mi.), CACA 17911
3. Imperial Irrigation District, (Transmission Line and Telephone Line, 8.72 mi.), CACA 18904
4. BLM El Centro Field Office, (Road, 1.66 mi.), CACA 19131
5. Imperial County, (RS 2477 Road, Ogilby Road, unknown mi.), CACA 19171

6. TDS Telecommunications, (Underground Telephone Line, 9.27 mi.), CACA 26357
7. U.S. Border Patrol, (Security infrastructures), CACA 34052
8. Imperial Irrigation District, (Upgraded/Extended Existing Power Line, 3835.0 ft.), CACA 35934
9. Bureau of Reclamation, (Test Wells-Hydrologic Data Collection), CACA 39659
10. U.S. Border Patrol, (Surveillance Facility & Access Road), CACA 40000
11. California Department of Transportation, (Communication Site, Ogilby), CACA 40358
12. Level Three Communications, (Fiber Optic Cable, 10.02 mi.), CACA 41192
13. American Tower, (Communication Site, Ogilby), CACA 41222
14. Imperial Irrigation District, (Power Line, 914.30 ft.), CACA 42576
15. North Baja Pipeline, LLC (O&G Pipeline, 30 in., & Access Roads, 7.84 mi.), CACA 42662
16. TDS Telecommunications, (Underground Cable, 3960.0 ft), CACA 44445
17. U.S. Dept of Justice, INS, (Surveillance Site & Related Facilities), CACA 44558
18. Imperial Irrigation District, (Roads, 1.52 mi.), CACA 48214
19. BLM El Centro Field Office, (South Dunes Operation Center), CACA 49135
20. Imperial Irrigation District, (Power Line, 34.5kV, 375.0 ft.), CACA 49617
21. Imperial Irrigation District, (Irrigation Project), CALA 039762
22. California Dept of Public Works, (Material Site), CALA 041943
23. Dept of Energy/WAPA, (Transmission Line, 154kV, 11.54 mi.), CALA 055165
24. Bureau of Reclamation, (Power Trans/Irr Project 33.37 mi.), CALA 056654
25. Bureau of Reclamation, (All American Canal & Appurtenant Structures, 16.5 mi.), CALA 077775
26. Imperial Irrigation District, (Transmission Line, 92/161kV, 2.84 mi.), CALA 0164553

27. California Department of Transportation, (Federal Highway, unknown mi.), CALA 0165008
28. California Department of Public Works, (Federal Highway, unk . mi.), CARI 137
29. Santa Fe Pacific PPLN, LLC, (Cathodic Protection Site), CARI 375
30. California Department of Transportation, (Federal Highway, unknown mi.), CARI 01737
31. California Department of Transportation, (Federal Highway, unknown mi.), CARI 07237

T. 16 S., R. 21 E., secs. 29-32 inclusive.

1. Bureau of Reclamation, (Test Wells-Hydrologic Data Collection), CACA 39659
2. North Baja Pipeline, LLC, (O&G Pipeline, 30 in., & Access Roads, 7.84 mi.), CACA 42662
3. Imperial Irrigation District, (Irrigation Project), CALA 039762
4. Bureau of Reclamation, (All American Canal & Appurtenant Structures, 16.5 mi.), CALA 077775
5. Imperial Irrigation District, (Transmission Line, 92/161kV, 2.84 mi.), CALA 0164553

T. 17 S., R. 19 E., sec. 1.

1. San Diego Gas & Electric Co., (Power Line, 500kV, 4.0 mi.), CACA 5865
2. Level Three Communications, (Fiber Optic Cable, 10.02 mi.), CACA 41192
3. Imperial Irrigation District, (Irrigation Project), CALA 039762
4. Department of Energy/WAPA, (Transmission Line, 154kV, 11.54 mi.), CALA 055165
5. Bureau of Reclamation, (All American Canal & Appurtenant Structures, 16.5 mi.), CACA 077775

6. Imperial Irrigation District, (Transmission Line, 92/161kV, 2.84 mi.), CALA 0164553
7. California Department of Transportation, (Federal Highway, unknown mi), CARI 01737
8. California Department of Transportation, (Federal Highway, unknown mi), CARI 07237

T. 17 S., R. 20., secs. 1-6 inclusive.

1. San Diego Gas & Electric Co., (Power Line, 500kV, 4.0 mi.), CACA 5865
2. TDS Telecommunications, (Underground Telecommunications Cable, 9.27 mi.), CACA 26357
3. Level Three Communications, (Fiber Optic Cable, 10.02 mi.), CACA 41192
4. Imperial Irrigation District, (Irrigation Project), CALA 039762
5. Department of Energy/WAPA, (Transmission Line, 154kV, 11.54 mi.), CALA 055165
6. Bureau of Reclamation, (All American Canal & Appurtenant Structures, 16.5 mi.), CALA 077775
7. California Department of Transportation, (Federal Highway, unknown mi.), CALA 0165008
8. California Department of Transportation, (Federal Highway, unknown mi.), CARI 01737
9. California Department of Transportation, (Federal Highway, unknown mi.), CARI 07237

--- Union Pacific Railroad traverses on the east boundary of the Imperial Sand Dunes Recreation Area.

NOTE: Mileage recorded is the total miles for that right-of-way within the Imperial Sand Dunes Boundary, not within the specific township and range.

Surface and Subsurface Encumbrances

T. 11 S., R. 15 E.

Serial Number – CACA 19902

Acquired - Bureau of Reclamation

Grantor – Roy T. and Helene E. Johnson

Acres – 6.99

T. 13 S., R. 17 E.

Serial Number – CARI 05657

Withdrawal Military Contaminated Area

Holding Agency – U.S. Navy Dept.

Acres – 46,134.93

T. 13 S., R. 17 E., T. 13 S., R. 17 ½ E. T. 14 S., R. 17 E., and T. 14 S., R. 18 E.

Serial Number – CACA 17575

Geothermal, Steam

Admin Mgt Entity – BLM California State Office

Acres – 25,458.64

T. 15 S., R. 19 E., and T. 16 S., R. 19 E.

Serial Number – CACA 17572

Geothermal, Steam

Admin Mgt Entity – BLM California State Office

Acres – 7,860.00

T. 16 S., R. 19 E.

Serial Number – CACA 37234

Acquired - FLPMA

Acquiring Agency - BLM El Centro Field Office

Grantor – Sessions Family

Acres – 0.633

T. 16 S., R. 20 E.

Serial Number – CACA 34475

Withdrawal (All American Canal Lining Project) - PENDING

Holding Agency - Bureau of Reclamation

Acres – 5,117.00

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APPENDIX II

Environmental Database Results

Facility Index System (FINDS)—The FINDS database is an inventory of all facilities that are regulated or tracked by EPA. These facilities are assigned an identification number that serves as a cross-reference for other databases in the EPA program system. A review of the database results indicates that two FINDS sites have been identified within the survey area. These sites are: 1) Santa Fe Pacific Minerals, Mesquite Mine; and 2) Arid Operations, Inc. Both sites are located along SR-78 in the eastern portion of the Planning Area.

The report also includes a category of “unmapped” sites. Sites are included in the unmapped category when the database information is not accurate enough to positively identify the site locations. The two unmapped facilities are noted as: 1) United States Department of Interior Laguna Field Office US Government, Route 1 Box 201, Winterhaven, California 92283, and 2) Glamis Radio Repeater, Black Mountain, Glamis, California 92248.

USGS Wells/WATER WELLS—The Groundwater Site Inventory (GWSI) database is maintained by the USGS. The database contains information for over one million wells and other sources of groundwater that the USGS has studied, used, or documented during research. A review of the database results indicates that four USGS WATER WELLS have been identified within the survey area. These WATER WELLS are used by the USGS for research purposes and are located in the northern, eastern, and southern portions of the Planning Area.

State of California Aboveground Storage Tanks (AST)—The database maintains a list of ASTs. A review of the database results indicates that one state AST site has been identified within the survey area: Newmont Gold Company. This site is located along SR-78 in the eastern portion of the Planning Area.

GNRTR—The database maintains a list of RCRA-registered small or large generators of hazardous waste. A review of the database results indicates that two GNRTR sites have been identified within the survey area. The sites are Santa Fe Pacific Minerals and Arid Operations, Inc. Both sites are registered small quantity generators and are located along SR-78 in the eastern portion of the Planning Area.

SPILLS—The database maintains a list of spills from the Emergency Response Notification System (ERNS). The ERNS is a national computer database system that is used to store information on the sudden, accidental, or both types of releases of hazardous substances, including petroleum, into the environment. The ERNS contains preliminary information on specific releases, including the spill location, the substance

released, and the responsible party. A review of the database results indicates that two ERNS sites have been identified within the Planning Area.

On July 3, 1991, 50 gallons of sodium cyanide solution were spilled at a site located along SR-78 in the eastern portion of the Planning Area. The origin of the spill was unknown, and no waterway was affected by the spill. Based on the report provided by Fidelity Information Services, no further monitoring or remedial action has been required. Therefore, this site has a low potential to affect existing conditions in the Planning Area.

On June 26, 2000, 9,900 pounds of hydrogen cyanide emissions were released to the atmosphere at a site located along SR-78 in the eastern portion of the Planning Area. No other medium was affected by the release. The origin of the release was not given. Due to the time that has elapsed since the release, the site has a low potential to affect existing conditions within the Planning Area. Based on the environmental database report provided by Fidelity Information Services, no further monitoring or remedial action has been required. Therefore, this site has a low potential to affect existing conditions in the Planning Area.

**TABLE N-1
KNOWN HAZARDOUS SITE DISTRIBUTION SUMMARY**

Agency/Database	Type of Records	Within 1/8 mile	1/8 to 1/4 mile	1/8 to 1/2 mile	1/8 to 1 mile
Databases searched to 1/2 mile					
State – FINDS	Facility Index System	2	0	0	-
USGS/State – WATER WELLS	Federal and State Drinking Water Sources	4	0	0	-
Databases searched to 1/4 mile					
State – AST	Registered aboveground storage tanks	1	0	-	-
Databases searched to 1/8 mile					
EPA – GNRTR	RCRA registered small or large generators of hazardous waste	2	-	-	-
State – SPILLS	State Spills List	2	-	-	-
Total Sites		10	0	0	0

prbo

2004-2007 Report

Potential Off-road Vehicle Impacts on Bird Populations within Mixed-
Woodlands at the Algodones Dunes

APPENDIX O

Chris McCreech and Christy Howell
31 December, 2008

PRBO Contribution No. 1660

PRBO Conservation Science
3820 Cypress Drive
Petaluma, CA 94954
cmccreech@prbo.org

designated as the responsible party. A review of the response results indicates that two other sites have been identified within the Planning Area.

On July 2, 1991, 30 gallons of acetone mixture solvent were spilled at a site located along SR-74 in the western portion of the Planning Area. The origin of the spill was unknown, and no emergency was affected by the spill. Based on the report provided by Fidelity Information Services, no further monitoring or remedial action has been required. Therefore, this site has a low potential to affect existing conditions in the Planning Area.

On June 25, 2000, 9,900 pounds of hydrochloric acid were released in the atmosphere at a site located along SR-72 in the western portion of the Planning Area. No other medium was affected by the release. The origin of the release was not given. Due to the time that has elapsed since the release, the site has a low potential to affect existing conditions within the Planning Area. **THIS PAGE IS INTENTIONALLY BLANK.** No further monitoring or remedial action has been required. Therefore, this site has a low potential to affect existing conditions in the Planning Area.

APPENDIX D KNOWN HAZARDOUS SITE DISTRIBUTION SUMMARY

Agency/Databases	Type of Database	Within 1/5 mile	1/5 to 1/2 mile	1/2 to 1 mile	1 mile to 1 1/2 miles
Surface Water					
State - FROG	Facility Index System	2	0	0	0
USGS-State - WATER WELLS	Federal and State Drinking Water Sources	4	0	0	0
Landfills					
State - AST	Registered aboveground storage tanks	0	0	0	0
Other					
EPA - GNPYX	RCRA facilities and/or large generators of hazardous waste	2	0	0	0
State - SPILLS	State Spill List	2	0	0	0
Total Sites		10	0	0	0



2004-2007 Report
Potential Off-road Vehicle Impacts on Bird Populations within Microphyll
Woodlands at the Algodones Dunes



Chris McCreedy and Chrissy Howell
31 December, 2008

PRBO Contribution No. 1660

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PRBO

Potential Off-road Vehicle Impacts on Bird Populations within Microphyll
Woodlands at the Algodones Dunes
2004-2007 Report

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Chris McCauley and Cheryl Howell
31 December, 2008

PRBO Contribution No. 1660

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INTRODUCTION

The present investigation was carried out in the Department of Geology, University of Toronto, Canada, during the summer of 1964. The work was supervised by Dr. J. H. Van der Plighe, and the results are presented in this report. The study was financed by the Department of Geology, University of Toronto, and the author wishes to express his appreciation to the Department for its support. The author also wishes to thank Dr. J. H. Van der Plighe for his helpful criticisms of the manuscript.

The purpose of this investigation was to determine the distribution of the various types of rocks in the study area. The study was carried out in the field and in the laboratory. The field work was carried out in the study area, and the laboratory work was carried out in the Department of Geology, University of Toronto. The results of the field work are presented in the field notes, and the results of the laboratory work are presented in the laboratory notes. The results of the field work are presented in the field notes, and the results of the laboratory work are presented in the laboratory notes.

STUDY AREA

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INTRODUCTION

This report summarizes findings from four springs of point count surveys (2004-2007) that were conducted for the El Centro Bureau of Land Management (BLM) Field Office. Surveys focused on Blue Palo Verde (*Parkinsonia florida*)/ Ironwood (*Olneya tesota*) woodlands situated east of the Algodones Dunes, Imperial County, CA (Figure 1). These woodlands host vegetation assemblages similar to those found in washes and arroyos across the Sonoran Desert, and may be referred to as *microphyll woodland*, *xeric riparian* or *xeroriparian woodland*, or *Sonoran Desert thornscrub woodland*, depending on the particular source of information and on the physiography of the particular site. Surveys were designed to assess potential effects of off-highway vehicle use on the migrant and breeding birds that depend on microphyll woodlands for survival.

In *A Natural History of the Sonoran Desert* (2000), Mark Dimmitt wrote that “dry washes occupy less than five percent of this subsection (the Lower Colorado River subsection) of the Sonoran Desert, but support ninety percent of its bird life (8).” Yet New Mexico’s *Comprehensive Wildlife Conservation Strategy* (2006) states that “the condition of xeric riparian communities is largely unknown,” and that “though acknowledged as important habitat, relatively few studies have focused on these habitat types. (226).” It is critical that we inventory and quantify bird populations of these under-studied habitats in the face of increasing anthropogenic pressures in the Desert Southwest.

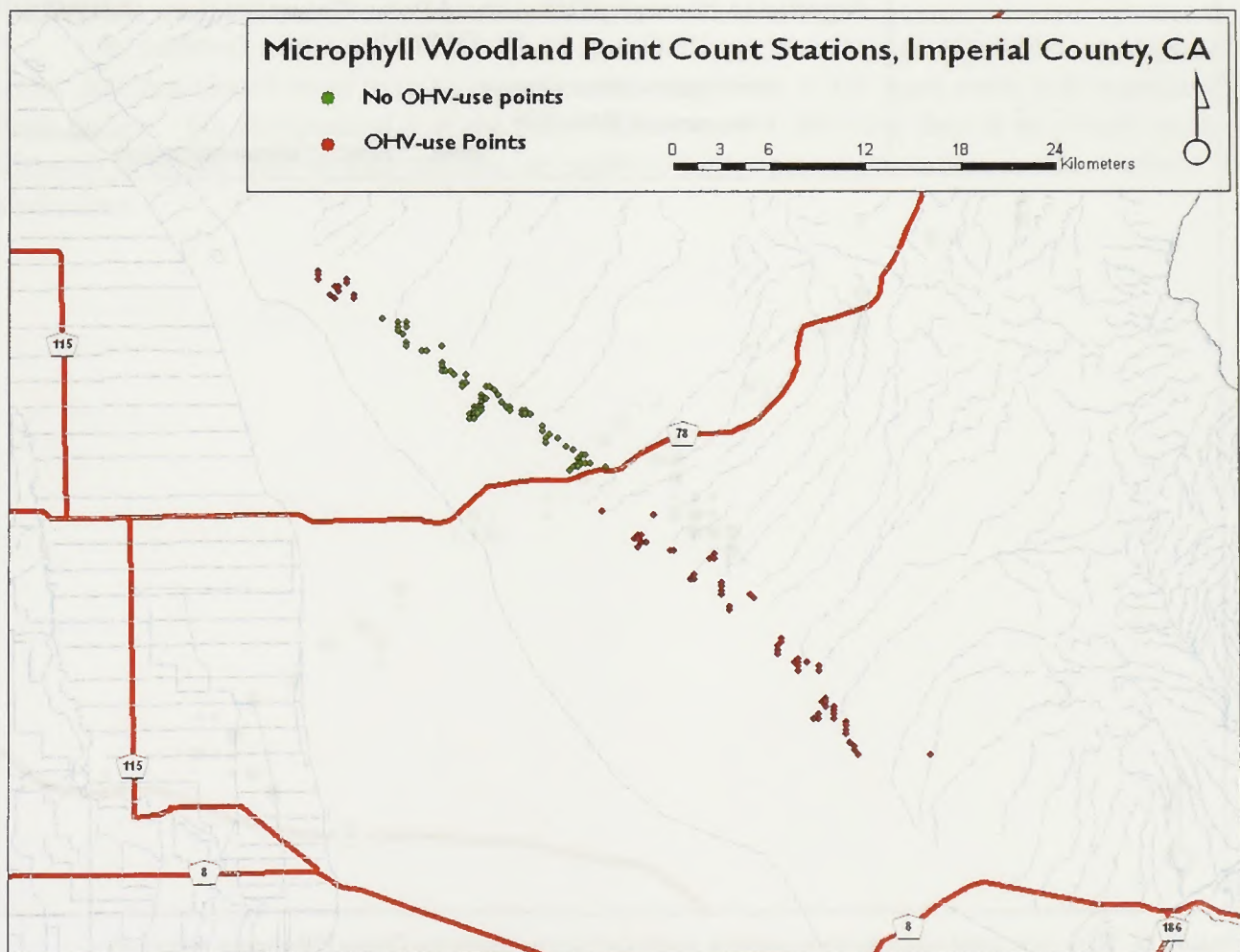


Figure 1. Point count stations initiated by the BLM El Centro Field Office, east of the Algodones Dunes.

SUMMARY

The El Centro BLM Field Office initiated 139 point count stations across microphyll woodlands east of the Algodones Dunes and surveyed 70 of them from 2004-2007 (Figures 2a-c). In sum, we found significantly ($p<0.05$) higher abundances of both migrants and breeders in areas where off-highway vehicle use is not allowed, and of the 18 most common species, seven were significantly more abundant in areas where off-highway vehicle use is not permitted. Only one species (Verdin) were significantly more abundant in areas with OHV use, but as will be explained, this Verdin result may be spurious.

Migrant abundance, richness, and diversity, were all positively correlated to winter precipitation, and migrant and breeding abundance were negatively correlated with temperature. Migrant response to precipitation at the Algodones Dunes matched patterns found across PRBO's woodland sites (CM *in prep*), where migrant abundance and diversity at sites farthest from true riparian areas such as the Colorado River respond most strongly to changes in winter precipitation.

Though there were significantly more breeders and migrants in areas where OHV-use is not permitted, there is circumstantial evidence in the data that suggest that the "best" habitat in the study area is in areas closed to OHV-use.

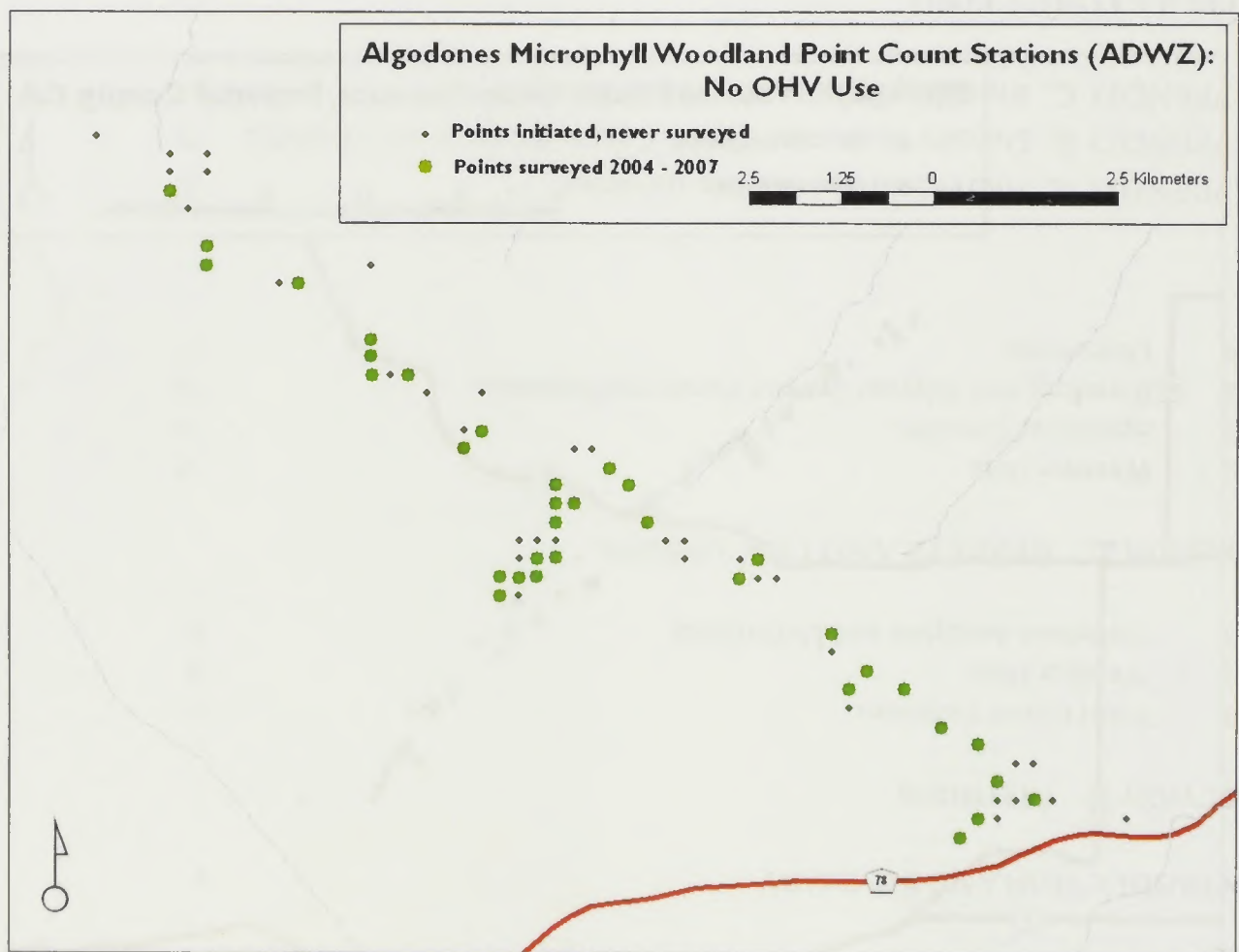


Figure 2a. Sixty-nine point count stations initiated inside the North Algodones Dunes Wilderness, where no OHV use is allowed. Thirty-five points have been surveyed from 2004-2007.

The four-year span of these surveys covered a period of average precipitation (2004), well above-average winter and spring rainfall (2005), and two consecutive winters of intense drought with lower temperatures (2006-2007). Our analyses focus on potential effects of winter/spring precipitation (Nov. 1 through May 31), winter temperature (January through March), and off-highway vehicle (OHV)-use management regime (no use allowed or use permitted) on migrant and breeder abundance, richness, and diversity across the study area.

Importantly, no vegetation data have been collected for surveyed sites.

Surveyors detected 70 species during point count surveys over the course of four seasons (Appendix A). The addition of these sites to a concurrent study conducted by PRBO in microphyll woodlands of the Lower Colorado River Valley (270 stations in Arizona and 410 in California) provides a complete regional baseline of breeding and migrant bird populations on washes of the Lower Colorado River Valley section of the Sonoran Desert.

We found that as of 2007, there are generally not enough data to assess detectability and generate abundance estimates with program DISTANCE (we therefore used estimates generated with assumed constant detection $\beta=1$). We recommend that the BLM survey all 139 stations in the study area to increase sample size, and to record all distances to the exact meter. Until vegetation at all sites is assessed, it is questionable to assume that any differences in demographic parameters between open and closed sites stem from recreation pressure and not habitat differences.

In addition, McCreedy (2006) found that OHV use can vary greatly within management units, and that closed areas may have substantial illegal use, while open areas may occasionally have no use. We recommend that the BLM record annual OHV-use data at all points, such as distance to active trail or trail density, in order to better assess recreation pressure across the study area.

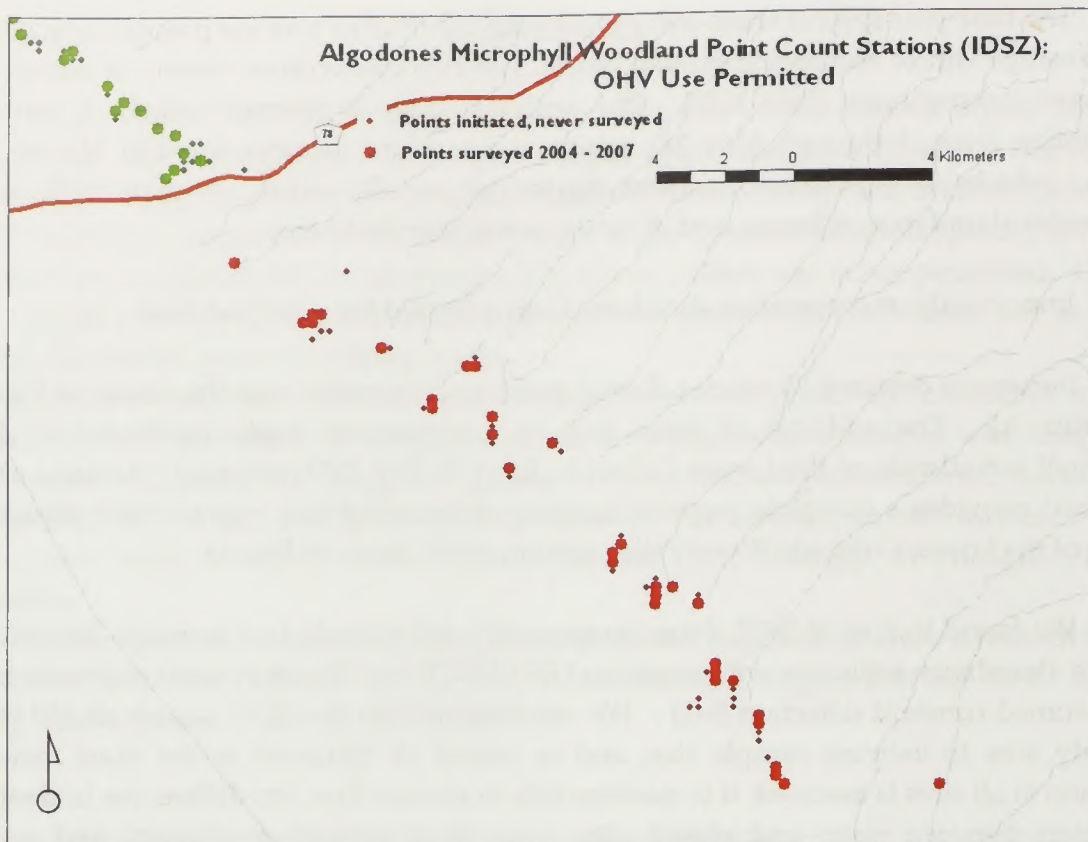


Figure 2b. Fifty-eight point count stations initiated south of the North Algodones Dunes Wilderness, where OHV use is allowed. Thirty-two points have been surveyed from 2004-2007.

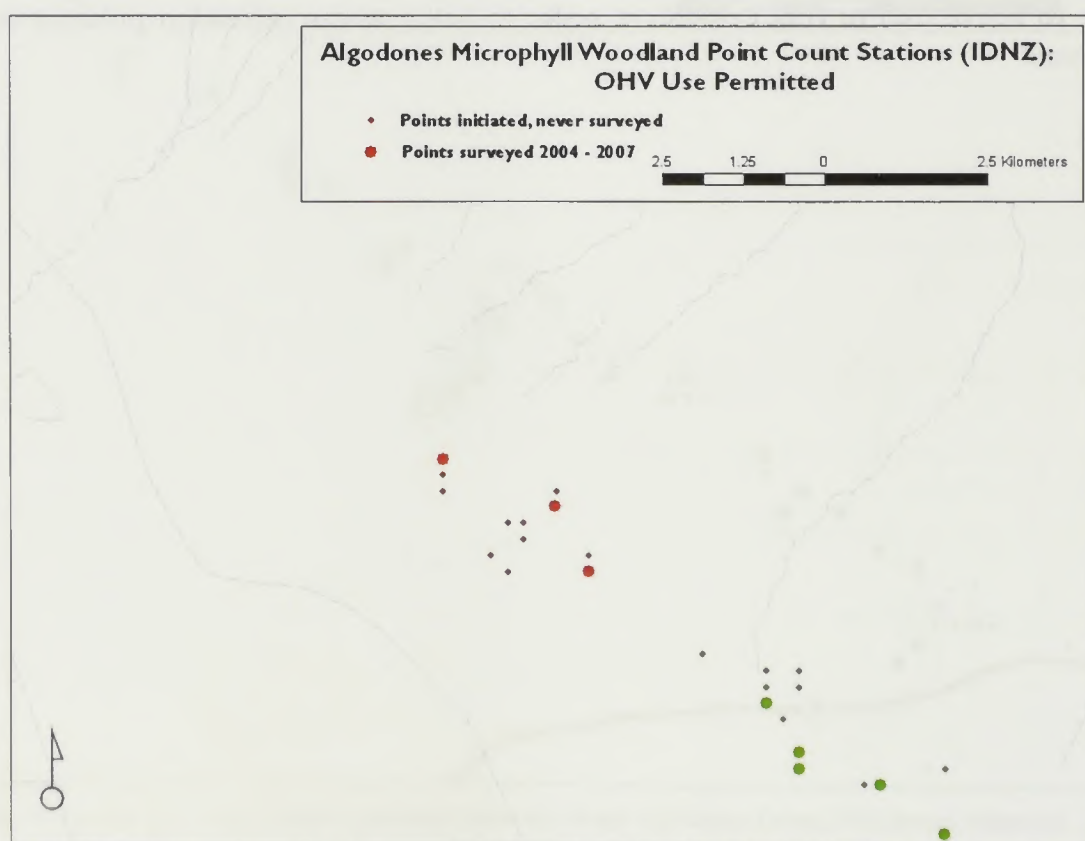


Figure 2b. Twelve point count stations initiated north of the North Algodones Dunes Wilderness, where OHV use is allowed. Three points have been surveyed from 2004-2007.



Figure 3. Illegal off-highway vehicle use observed at Mohave Wash, Bill Williams National Wildlife Refuge. These vehicles (as well as three Jeeps not pictured) ignored a clearly-signed no-use boundary at the Refuge edge in order to picnic at the Bill Williams River's banks.

METHODS

1.1 Point Count Censuses

Using and expanding upon a grid of stratified-random points generated by the California BLM in 2002 (McCreedy 2004), the BLM conducted censuses in microphyll woodland at 70 point count stations in central Imperial County, east of the Algodones Dunes (Figures 2a-c). All point count stations were placed within 50 m of microphyll woodland. Point count station names, UTM (NAD83) coordinates, and dates surveyed are presented in Appendix B. Points within the North Algodones Dunes Wilderness were coded "ADWZ", and points north and south of the wilderness area coded "IDNZ" and "IDSZ" respectively.

The BLM conducted 5-minute Variable Circular Plot point counts following standards recommended by Ralph et al. (1993 and 1995) and Fancy and Sauer (2000). Distance to each detection was measured using a Leica Rangefinder LRF800, (all detections greater than 100 m were lumped as "greater than 100" to avoid false precision), or labeled as "flyover" if the individual was seen as in transit and not using the habitat. Each station was visited twice during peak bird breeding season (between April 1 and April 30), and visits were at least 15 days apart.

All stations were counted by biologists familiar with the songs and calls of the birds in the area. When feasible, stations were surveyed in opposite order between visits, in order to minimize effects of time of day on detection rates. Censuses were conducted from within 30 minutes after local sunrise until approximately 4 hours later, and were not conducted in excessively windy or rainy conditions. Detections were categorized as song, visual, or call (drumming woodpeckers, flushing doves, and displaying hummingbirds were exceptions, and were categorized as 'drumming', 'wing beats', or 'displaying').

1.2 Weather Data

Weather data were collected at Cahuilla RAWs station near the intersection of Gecko Road and California State Highway 78 (UTM NAD 83: 670768e/3649810n). The Cahuilla station is at an equitable elevation to the study site (278 feet above Sea Level) and is only 3.5 miles from the nearest point count station. Because weather variables have a tendency to be highly correlated, we limited our analyses to two variables which we felt would be biologically important in this system based on our experience in other xeric systems: we calculated the average temperature from January through March of the year data were collected, and rainfall from November 1 of the previous year through May 31.

1.3 Statistical Analysis and Definitions

Species Richness, Species Diversity, and Species Abundance

We calculated species diversity and species richness using two bird population datasets: 1.) all species detected (migrants and breeders) and 2.) a subset of 45 breeding species. We did not include flyover detections in analyses. A list of breeding species is provided in Appendix D, and was generated from confirmed breeding at California and Arizona sites from 2003-2007.

Species Diversity

We calculated species diversity for each point count station and each wash grid using all detections within 100 m, summed over two visits. We used the transformed Shannon-Wiener index of biological diversity, denoted N_1 (MacArthur 1965, Krebs 1989). This index of diversity is usually highly correlated with bird species richness, but also takes the number of individuals of each species into account. Higher scores on the Shannon-Wiener index indicate higher species richness and more balanced numbers of individuals of each species added. Expressed mathematically:

$$N_1 = e^{H'} \text{ and } H' = - \sum_{i=1}^{i=S} (p_i)(\ln p_i)$$

Where S = total species richness and p_i is the proportion of the total numbers of individuals for each species (Nur et al. 1999). High index scores indicate both high species richness and more equal distribution of individuals among species.

Species richness

We calculated the number of species for each point count station and each wash grid, using all detections within 100 m, summed over two visits.

By-species Abundance

We calculated the mean number of individuals detected, averaged over the entire wash grid, then averaged over two visits, using all detections within 100 m. Because few species are 100% detectable, such calculations may underestimate absolute density. Therefore results should be considered minimum estimates of abundance.

Species diversity, richness, and relative abundance summaries were conducted using Point Count 2.75 (Ballard 2002).

Maximum likelihood models

Background: Analyzing trends with only four years of data may lead to spurious results and is generally not recommended or informative as a greater number of years are needed to detect trends (Nur et al. 1999, Sokal and Rohlf 1995). At the same time, there was obviously annual variation in the data that we wanted to explore. We opted to examine the effect of three independent variables: rain fall from November through May, mean temperature (January-March), and OHV status. We conducted maximum likelihood analyses in SAS using PROC GENMOD (SAS Institute 2001) and we assumed constant detectability to 100m.

Ordinary least squares (OLS) method for analyzing count data is not generally appropriate because count data are seldom normally distributed (Cameron and Trivedi 1998). Maximum likelihood approaches using a Poisson or negative binomial distribution and a log link are preferable because they do not assume a normal distribution and they are suitable for ill-dispersed data. Poisson regression is appropriate when the mean and variance are equally dispersed, whereas negative binomial regression can be used to model over- or under-dispersed data.

Selection of distribution: We first evaluated the fit of both the Poisson and negative binomial distribution by comparing the deviance and log-likelihood values for both models in order to select the best distribution. Once we selected the best distribution (negative binomial or Poisson) for a given model, we evaluated the overall goodness of fit of the model based on the ratio of deviance divided by the number of degrees of freedom. When this ratio is close to or less than one, model fit is very good. Large ratio values may indicate model misspecification or an over-dispersed response variable indicating a less optimal fit (ratio > 2.0).

Dependent variables: Once we selected the appropriate distribution, we modeled the effects of the three independent variables on dependent variables relating to avian abundance, species diversity, and species richness. We first examined effects on pooled species abundance, pooled diversity and pooled species richness for all birds. However, because migrants and breeders may react differently to annual or climatic patterns we also calculated pooled abundance, diversity, and richness separately for migrants and breeders. Additionally we analyzed abundance for the 18 species with 50 or greater detections (Appendix A).

Significant covariates: For each dependent variable we evaluated the effects of OHV use, rain, and winter temperature using PROC GENMOD with a Type3 analysis (analogous to Type III sums of squares in OLS regression; Allison 1999). The Type3 analysis computes likelihood ratio statistics to analyze the significance of each covariate in a manner that does not depend on the order of the specified terms. We considered covariates to be statistically significant if $p < 0.05$; however we show p -values $0.05 > x < 0.10$ in the tables.

Incidence rate ratio: We used a contrast estimate statement in PROC GENMOD to evaluate the incidence rate ratios for sites with and without OHV use, as well as to evaluate the effect of increasing temperature or increasing rainfall by one unit. To calculate the incidence rate ratio we exponentiated the parameter estimates and standard errors from the Type3 analysis. (Parameter estimates must be exponentiated because Poisson and negative binomial regression both use a log link so one needs to transform to the appropriate units and scale).

Mean OHV effect: For models in which OHV status was a significant predictor (based on *Significant Covariates*, above), we calculated the least square mean (lsmean) for abundance (or diversity/richness) at sites where OHV-use was allowed and not allowed. Lsmeans are the mean for a variable (e.g. abundance) after adjusting for the other variables in the model (i.e. temperature and rainfall). We present transformed (exponentiated) values for the lsmeans.

Analyses of density using Distance

Selection of detection function: We used the program DISTANCE (Buckland et al. 2001) to compare density between OHV use and non-use sites for the 10 most abundant species (Appendix A), as well as for Brown-headed Cowbirds, which are a species of management concern. We fit a detection function for each species pooled across all years and specified a hazard-rate key function with a hermite polynomial expansion; the maximum number of adjustments was constrained to 2 because of the limited number of distance bins. We also explored using other key functions such as uniform and half-normal, both with and without cosine adjustments, but the hazard-rate key function was most supported by the data, based on $\Delta AICc$ values. We evaluated the goodness of fit of the detection function for each species using chi-square. A non-significant test indicated that the data fit the function well. In most cases the detection functions had a

significant GOF test indicating that the function did not fit the data well. This was generally due to heaping in the data at one or more distance categories (discussed later).

We calculated models for each species with all data pooled as well as a stratified model which accounted for OHV status and year. We compared the pooled and stratified models for each species and the best model was determined by lowest $\Delta AICc$ score. We calculated density and 95% confidence intervals for each species for each level of year (2004-2007) and OHV status (present or absent) for a total of 8 levels of stratification.



Figure 1. Distribution of OHV status (Present/Absent) across years (2004-2007) for a specific species.



Figure 2. Distribution of OHV status (Present/Absent) across years (2004-2007) for a specific species.

RESULTS AND DISCUSSION

2.1 WEATHER DATA

Though we do not have long-term averages for the Cahuilla RAWS station, the 2004-2007 winter/spring precipitation matched patterns seen at other sites in the region: a near-normal winter and spring in 2004; a very wet 2005; and extreme drought in 2006 and 2007 (Figure 4). Temperature patterns also matched regional patterns during the study's duration (Figure 5).

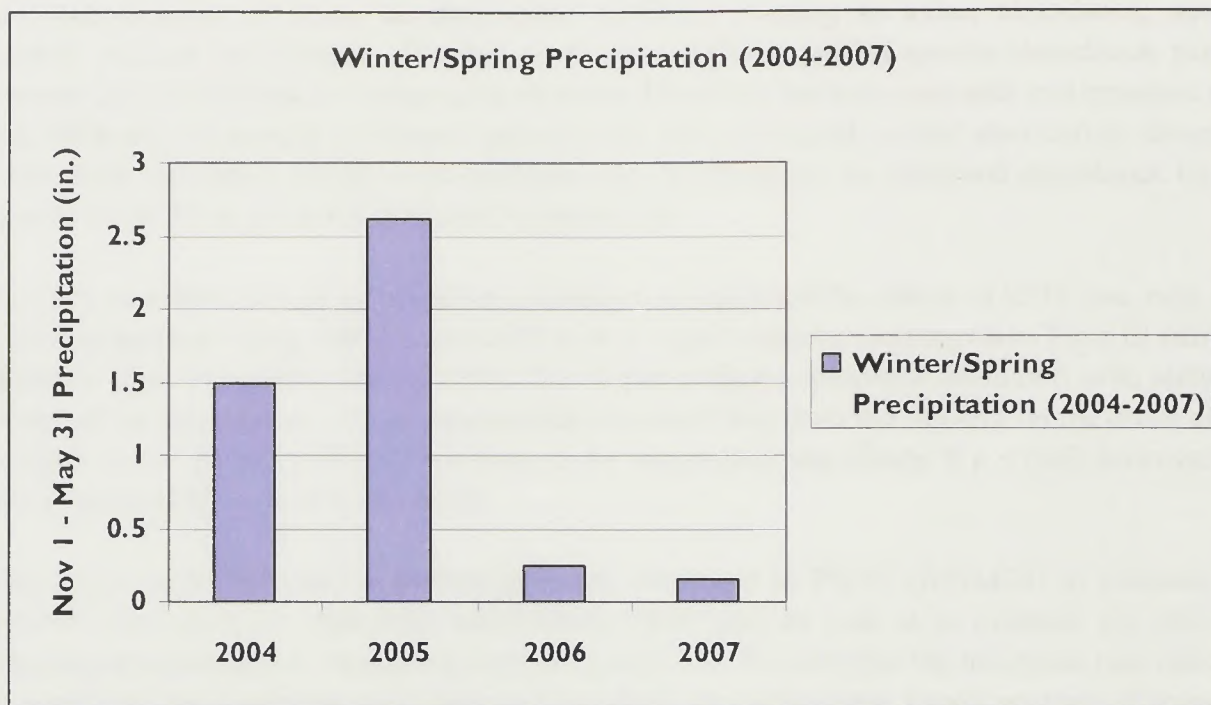


Figure 4. November 1 through May 31 precipitation recorded at the Cahuilla RAWS station, 2004-2007.

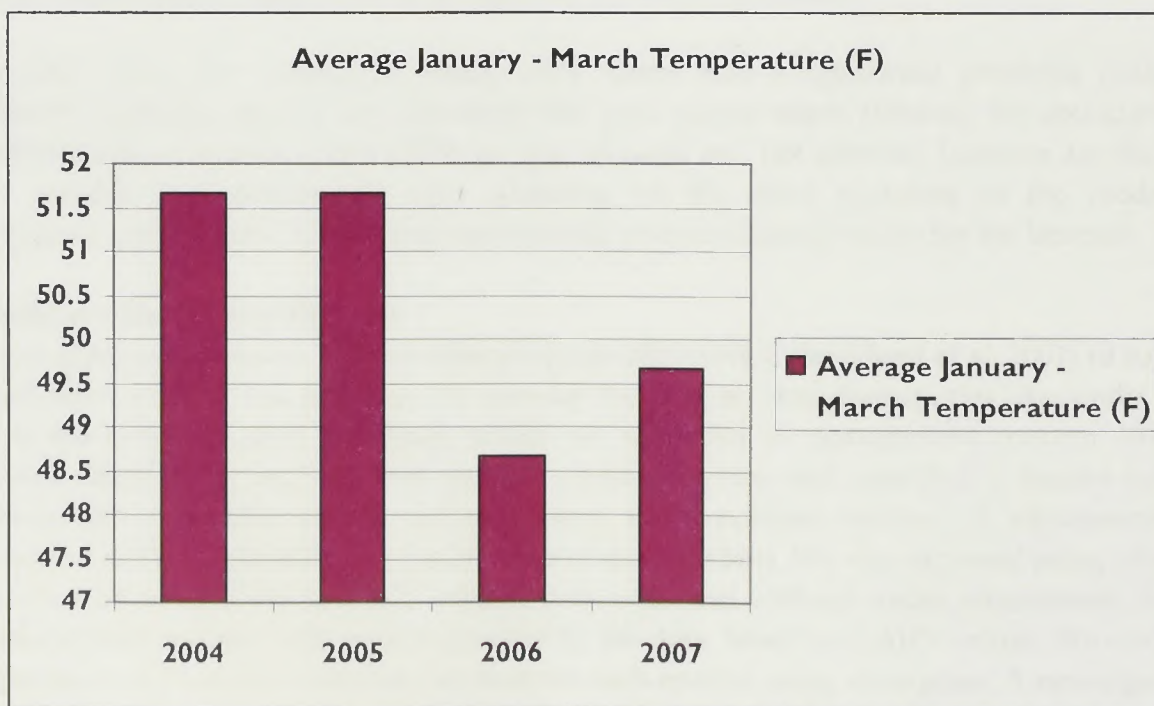


Figure 5. January through March mean temperatures recorded at the Cahuilla RAWS station, 2004-2007.

2.2 SPECIES OF CONCERN

Surveyors detected 11 sensitive species, including 2 California State Endangered Gila Woodpeckers within the Algodones Dunes Wilderness (Table 1). McCreedy (2006) reported a small population of Gila Woodpeckers annually nesting at the Milpitas Wash, only 45 km from the Algodones Dunes Wilderness, and it is possible that this species may nest in the study area.

Table 1. Species of concern detected during spring surveys, 2004-2007. Breeding species in **bold type**.

Common Name	California BSSC	National PIF Watch List	Audubon 2007 Watch List
Northern Harrier	Yes		
Gila Woodpecker	State Endangered		
Costa's Hummingbird		range restricted	Yellow list
Calliope Hummingbird		threatened and declining	Yellow list
Rufus Hummingbird		threatened and declining	Yellow list
Loggerhead Shrike	Yes		
Crissal Thrasher	Yes		
Lucy's Warbler	Yes	range restricted	Yellow list
Yellow Warbler	Yes		
Brewer's Sparrow		threatened and declining	Yellow list
Yellow-headed Blackbird	Yes		
California Bird Species of Special Concern (http://www.prbo.org/cms/docs/ecol/criteria.pdf)			
PIF WL = Partners In Flight Watch List (http://www.abcbirds.org/pif/pif_watch_list.htm)			
Audubon WL = Audubon 2002 Watch List (http://www.audubon.org/bird/watchlist/index.html)			

2.3 BREEDING AND MIGRANT PARAMETER ESTIMATES

Maximum likelihood models

Selection of distribution: We evaluated 27 separate models related to avian abundance, diversity, and richness for individual, pooled, and the total number of species (Table 2). The negative binomial distribution had the best fit for 16 models and the Poisson distribution had the best fit for 11 models. In general, model fit was very good with the ratio of deviance to degrees of freedom approaching or equaling 1.0 for most models and never exceeding 2.0. We also examined the parameter estimates and standard errors for all models to check for unusually large values (e.g. >50) as these can be evidence of ill-dispersion and/or poor model fit, but we did not encounter any problems.

Table 2. The effects of OHV status, rainfall, and temperature on avian abundance, diversity, and richness for individual, pooled, and total number of species. Shading indicates statistical significance.

^a For all models DF=274.

^b Significance of effect based on chi-squared statistic from likelihood ratio test; DF=1 for each test.

Model	Distribution	Deviance /DF ratio ^a	OHV ^b	Rain ^b	Temp ^b
Total abundance	neg binomial	1.05	<0.0001	ns	<0.0001
Total S-W Diversity	neg binomial	1.00	ns	0.053	0.0007
Total richness	neg binomial	1.02	0.0195	0.049	<0.0001
Migrant abundance	neg binomial	1.10	<0.0001	0.0017	<0.0001
Migrant S-W Diversity	neg binomial	1.13	ns	0.0038	<0.0001
Migrant richness	neg binomial	1.12	ns	0.0017	<0.0001
Breeder abundance	neg binomial	1.04	<0.002	ns	0.0093
Breeder S-W Diversity	poisson	0.66	ns	ns	ns
Breeder richness	poisson	0.91	0.035	ns	0.055
MODO	neg binomial	1.08	0.0005	0.0246	ns
ATFL	neg binomial	1.01	ns	ns	ns
BRSP	neg binomial	0.51	0.0002	ns	ns
GAQU	neg binomial	0.70	ns	0.0259	0.0048
BTGN	neg binomial	1.08	0.09	0.0031	0.0632
VERD	neg binomial	1.02	0.022	ns	ns
WCSP	neg binomial	0.42	ns	0.0071	ns
CACW	neg binomial	0.98	0.0219	0.0889	0.0914
OCWA	poisson	1.62	0.0006	ns	<0.0001
BUOR	poisson	1.63	ns	<0.0001	ns
WAVI	poisson	1.51	<0.0001	0.0058	<0.0001
NAWA	poisson	1.56	0.053	0.0003	ns
WIWA	poisson	1.09	ns	ns	0.0047
LBWO	poisson	0.92	ns	ns	ns
WEFL	neg binomial	0.71	ns	0.0795	ns
BHCO	poisson	1.04	0.004	ns	0.017
LOSH	poisson	0.83	0.006	0.0016	0.0031
BHGR	poisson	0.85	ns	ns	0.0014

Significant covariates:

OHV status, rainfall, and temperature were all significant predictors of pooled abundance, diversity, and richness; migrant abundance, diversity, and richness; breeder abundance and richness (Table 2).

Table 3. Incidence rate ratios and standard errors (in parentheses) for OHV status, rainfall, and temperature effects on avian abundance, diversity, and richness for individual, pooled, and total number of species. All values have been log transformed. Shading indicates statistically significance variables identified in significant covariate analysis (Table 2).

Model	OHV ^a	Rain ^b	Temp ^c
Total abundance	0.69(0.06)	1.08(0.06)	0.74(0.05)
Total S-W Diversity	0.95(0.05)	1.08(0.04)	0.85(0.04)
Total richness	0.87(0.05)	1.09(0.05)	0.81(0.04)
Migrant abundance	0.50(0.09)	1.45(0.17)	0.53(0.07)
Migrant S-W Diversity	0.89(0.11)	1.29(0.11)	0.62(0.06)
Migrant richness	0.91(0.10)	1.33(0.12)	0.59(0.06)
Breeder abundance	0.77(0.06)	0.97(0.06)	0.84(0.06)
Breeder S-W Diversity	0.93(0.06)	1.02(0.04)	0.95(0.05)
Breeder richness	0.89(0.05)	1.00(0.04)	0.92(0.04)
MODO	0.54(0.10)	0.76(0.09)	0.96(0.14)
ATFL	1.08(0.10)	0.91(0.06)	1.01(0.08)
BRSP	0.21(0.08)	1.13(0.30)	0.72(0.22)
GAQU	0.75(0.22)	1.56(0.31)	0.49(0.11)
BTGN	1.28(0.19)	0.73(0.08)	1.23(0.14)
VERD	1.46(0.24)	0.90(0.11)	0.96(0.13)
WCSP	0.77(0.31)	2.10(0.53)	1.11(0.36)
CACW	0.67(0.12)	1.22(0.15)	0.79(0.11)
OCWA	0.54(0.09)	1.20(0.19)	0.46(0.08)
BUOR	0.75(0.13)	0.44(0.08)	1.20(0.19)
WAVI	0.31(0.07)	1.74(0.35)	0.25(0.06)
NAWA	0.69(0.14)	0.55(0.10)	1.28(0.22)
WIWA	0.91(0.20)	0.96(0.19)	0.57(0.12)
LBWO	1.04(0.24)	0.90(0.14)	1.20(0.21)
WEFL	1.08(0.26)	0.67(0.16)	0.82(0.18)
BHCO	0.48(0.13)	1.22(0.23)	0.60(0.13)
LOSH	0.47(0.13)	1.80(0.35)	0.51(0.12)
BHGR	0.35(0.39)	1.40(0.33)	0.45(0.12)

^a Incidence rate modeled as OHV-use site relative to OHV non-use site, assuming other variables are constant.

^b Incidence rate modeled as change in dependent variable relative to a 1 unit increase in rainfall, assuming other variables are constant.

^c Incidence rate modeled as change in dependent variable relative to a 1 unit increase in temperature, assuming other variables are constant.

Incidence rate ratio:

Incidence rate ratios (Table 3) reveal positive or negative correlations. For example:

- Total abundance was a factor of 0.69 less on OHV-use sites relative to non-use sites.
- Verdin abundance was 46% greater on OHV-use sites relative to non-use sites.
- BHCO abundance was a factor of .48 less on OHV-use sites relative to non-use sites.
- A one unit increase in rain resulted in a gain in total richness by 9%, migrant abundance by 45%, migrant diversity by 29%, and migrant richness by 33%.
- A one unit increase in temperature decreased total abundance by 26%, total diversity by 15%, total richness by 19%.

Table 4. The 95% confidence interval for the least-squared means of OHV status on avian abundance, diversity, and richness for individual, pooled, and total number of species. Only models in which a significant effect of OHV was found are shown. All values have been log-transformed.

Model	CI lower OHV allowed	CI upper OHV allowed	CI lower No OHV	CI upper No OHV	Conclusion
Total abundance	11.98	15.07	17.49	21.91	lower on OHV sites
Total S-W Index					
Total richness	5.59	6.42	6.47	7.36	lower on OHV sites
Mig. abundance	2.47	3.85	4.84	7.70	lower on OHV sites
Mig. S-W Index					
Mig. richness					
Breeder abundance	9.11	11.49	11.86	14.90	lower on OHV sites
Breeder S-W Index					
Breeder richness	3.99	4.52	4.53	5.07	lower on OHV sites
MODO	2.03	3.34	3.79	6.12	lower on OHV sites
ATFL					
BRSP	0.25	0.76	1.24	3.45	lower on OHV sites
GAQU					
BTGN					
VERD	0.85	1.21	0.57	0.84	greater on OHV sites
WCSP					
CACW	0.43	0.66	0.67	0.96	lower on OHV sites
OCWA	0.19	0.32	0.37	0.56	lower on OHV sites
BUOR					
WAVI	0.07	0.15	0.27	0.39	lower on OHV sites
NAWA					
WIWA					
LBWO					
WEFL					
BHCO	0.10	0.19	0.23	0.37	lower on OHV sites
LOSH	0.08	0.18	0.20	0.34	lower on OHV sites
BHGR					

Mean OHV effect:

We estimated the least squares mean for each level of OHV status (non-use and use) for 13 models in which OHV status was significant in the *Significant covariate* analysis. Because the least squares mean also takes into account other variables in the model (i.e. temperature and rainfall) when calculating an estimated mean for OHV status, it may produce slightly different results (wider or narrower confidence intervals) than the likelihood ratio test and corresponding standard errors from the original analysis for significant covariates. However, for each of the 13 models the confidence intervals for use and non-use OHV estimates did not overlap. In all but one case (Verdin) abundance or richness was less on OHV-use sites than non-use sites.

Analyses of density using DISTANCE

We found that due to severe problems with heaping (low frequencies of detections close to the observer, with much higher frequencies at specific distances for each species), small sample sizes, and surveyors' tendencies to not always record distances to the exact meter (instead occasionally recording distances in bins), abundance estimates based on estimates of detectability were not helpful in relating patterns of abundance to covariates in the study area. For this reason, we assumed detectability to equal 1 in our modeling presented above.

Detection functions: The detection functions for Ash-throated Flycatchers, Brewer's Sparrows, Bullock's Orioles, Cactus Wrens, Gambel's Quails, Mourning Doves, Verdin, and White-crowned Sparrows indicated a significant lack of fit ($P < 0.05$), although it was close for Cactus Wrens and Verdin. Visual inspection of these probability density function graphs indicated that the Brown-headed Cowbird lacks data in first bin and possible heaping in 40-50m bin; Brewer's Sparrow heaping at 30-40m bin; Black-tailed Gnatcatcher heaping at the 20-30m bin; Bullock's Oriole heaping at 40-50m bin; Cactus Wren lack of data at the first bin and 20-30m bin; Gambel's Quail with many problems: sparse data 0-40m and then severe heaping at 40-50m; Mourning Dove large heap at 0-10m, perhaps due to flushing a very large flock off of a point; Verdin with scant data between 30-50m; White-crowned Sparrow with severe heaping at 20-30m. The most egregious of these were Mourning Dove and Gambel's Quail. Though heaping is common in bird surveys that assess for detectability over distance, heaping was particularly problematic and data sets generally small. Despite these problems, we proceeded with our analyses.

Density estimates using Distance: Stratification by year and OHV status increased the number of parameters in each model. The model with stratification was best supported by the data for ATFL, BRSP, BUOR, GAQU, MODO, and WCSP; but not for BHCO, BTGN, CACW, OCWA, and VERD.

We examined the confidence intervals (Appendix B) to determine differences in density among years and from OHV status. However, for nearly all species, the confidence intervals overlapped. However, we did find that:

- There were significantly more Brown-headed Cowbirds in non-OHV sites in 2004
- Mourning Dove numbers were highly variable among years.
- There were significantly more White-crowned Sparrows on OHV sites in 2004 relative to non OHV-use sites.

2.4 DISCUSSION

Abundance, diversity, richness

We found that over the course of the study, non-OHV sites in the North Algodones Dunes Wilderness yielded significantly higher estimates of migrant bird abundance, breeding bird abundance, and breeding species richness than sites where OHV-use is permitted. We found that winter/spring precipitation (November 1 – May 31) was positively correlated to migrant abundance, diversity, and richness, and that winter temperature was negatively correlated with all migrant parameters, and breeding species abundance as well.

For species-specific abundance estimates of the most common 18 species, we found that 7 species had significantly higher abundances within the North Algodones Dunes Wilderness, and one (Verdin) had significantly lower abundances within the NAD Wilderness (Table 2). Winter/spring precipitation was significantly and positively correlated with the abundances of eight species, and winter temperature was negatively correlated with the abundances of 7 species (Table 2).

Migrant species responses to winter/spring precipitation match patterns observed at simultaneously surveyed sites across the Lower Colorado River Valley (CM *in prep*), where migrant abundance and richness rapidly rise in response to increases in precipitation, particularly as distance from riparian refugia (such as the Colorado River or Bill Williams River) accumulates.

We did not find a significant relationship between winter/precipitation and breeding species abundance and richness, and this matches patterns other PRBO woodland sites in the region as well. For breeding species, it appears that it is the winter/spring precipitation *one year prior* (in essence, a one-year time lag) that impacts breeding species richness and abundance via productivity in the previous breeding season (CM *in prep*). For example, PRBO has found that during the course of the study (2004-2008), highest breeding species estimates and abundance tended to be in 2006, the driest winter/spring of the study. This is because the *previous* winter/spring was very wet, and productivity was at its highest level observed from 2004-2008 (CM *in prep*). We did not analyze this time lag for breeding species at the Algodones Dunes, for we have only just discovered this pattern at our other sites and did not anticipate it in time for this analysis. But the fact that within-year winter/spring precipitation was not significantly correlated to breeding parameters at the Algodones Dunes (just as at other PRBO microphyll woodland sites) suggests that a similar time-lag pattern may drive breeding species numbers at the Algodones Dunes as well.

Vegetation Assessment

The BLM has not conducted habitat/vegetation assessments at the Algodones Dunes points. As a result, although we have found significantly more breeders and migrants at non-OHV use sites within the North Algodones Dunes Wilderness, these differences should not be assumed to result from recreation pressure alone. Rather, the habitat within the North Algodones Dunes Wilderness may simply be of higher quality than habitat outside the Wilderness. There is circumstantial evidence that this is true: for example, 11 out of 12 Crissal Thrasher detections and 2 out of 2 Gila Woodpecker detections were within the North Algodones Dunes Wilderness— species which tend to only be found in the densest microphyll woodland habitat with the largest trees (CM *in prep*).

If there are differences in habitat quality between open and closed areas, are these differences due to habitat degradation from OHV use, or simply due to natural differences in physiography? The El Centro Field Office has a great opportunity here to quantitatively demonstrate whether OHVs do in fact degrade habitat to the point that migrant and breeding species of birds may no longer use it. Further, as recreation pressure increases, the BLM must have a baseline by which to measure future habitat degradation. We strongly recommend that the BLM El Centro Field Office conduct vegetation assessments on all points for these reasons, using methods standardized with vegetation assessments that PRBO has conducted throughout southeastern California and western Arizona.

In addition, we have found that actual OHV use on the ground does not necessarily conform to management units (McCreedy (2006). Thus, we also recommend that the BLM record annual measures of distance-to-trail and trail density at each point in order to better classify points according to their true use. Ideally, the BLM would combine these metrics with trail-counters that would measure use on an hourly basis, for comparison with similar data at the Chemehuevi Wash, San Bernardino County (McCreedy *in prep*), as well as to give the BLM a better sense of how different use rates manifest themselves in the landscape, in order to develop indices of use when trail-counters are not feasible.

Distance Sampling, Sample Size, and Survey Recommendations

For reasons described above, we elected to use indices of abundance in our analyses (assuming detection probability =1) rather than abundance estimates derived from program DISTANCE. This need is reflected in Johnson (2008):

Although distance sampling is ideally suited for certain situations, such as tortoise surveys in which distance from the observer is the primary factor influencing detection, the role of distance sampling for birds has been somewhat controversial. The requirement for a large number of detections to estimate a detectability function is one concern. Standard recommendations are for 60-100 detections per species, which basically eliminates the use of distance sampling for all but the commonest species, which typically are of lesser conservation interest (859).

It is not clear why only a portion of the 140 originally-designed points have been surveyed, but we strongly encourage the BLM to survey all 140 points to render the computation of abundance estimates that include detectability as more feasible. Data heaping at species-specific distances was often much more severe than patterns observed in other studies, and we suggest that it may benefit the BLM to employ more surveyors to eliminate potential survey bias.

In addition, while exact distances were occasionally recorded, distances were often recorded in bins. All PRBO sites in the region have been surveyed to exact meters since 2005, and we encourage this level of precision for Algodones Dunes sites as well. To avoid false-precision, we have truncated detections at 100m, referring to all detections beyond 100m as ">100". We suggest perhaps raising this truncation level to 150m, thus recording exact distances up to 150m, and all detections beyond as ">150m". These suggestions will help us to better fit detectability function models in the future.

In general, parameter estimates for the Algodones Dunes study area were somewhat higher than for other sites in the region (CM *in prep*). This was surprising, for while the

North Algodones Dunes Wilderness certainly contains quality habitat, it on a glance did not seem of markedly higher quality than other PRBO woodland sites with lower parameter estimates. One possible cause for elevated estimates is that detections of juvenile birds at the Algodones Dunes were included with other detections for analysis. Juvenile birds should be denoted with a "J" for each detection, in order to be filtered from analyses. We are unsure if juveniles were excluded from data provided by the BLM (for example, Loggerhead Shrike estimates seemed particularly high, and juvenile shrikes are frequently encountered during the point counting season). We stress that the BLM should ensure that no juvenile birds are included in analyses in the future.

Seventy of the approximately 140 originally-designed points have been surveyed from 2004-2007. It is not clear as to how these 70 points were selected. If these 70 points were not selected randomly from the larger 140-point set, then inferences should not be made between the Algodones Dunes data and data from other regional PRBO sites. The origin of the 70 point subset should be determined before regional inclusion of the Algodones data proceeds. Ideally, all 140 originally designed points would be surveyed in the future.

We also suggest that the BLM work to mix surveyors due to patterns in the data that may stem from surveyor bias. For example, Verdin was the only species found to be significantly more abundant in the open areas than in the closed area. This is striking, because Verdin likely respond to woodland habitat characteristics in a similar fashion to other species found much more frequently in the closed area than in the open area. Upon further inspection, the number of Verdin detected during the study were: 91 in 2004, 28 in 2005, 112 in 2006, and 10 in 2007. While these numbers match a pattern of one-year lag (wet 2003 and 2005 produced high numbers of Verdin in 2004 and 2006), the extreme between-year variation is striking, particularly as we have found that of all study species, Verdin productivity was least effected by the 2006 and 2007 droughts (CM *in prep*). Although less Verdin were found in the North Algodones Dunes Wilderness every season, only 7 were found in the Wilderness in 2005 which is again striking, as 2004 was not a particularly dry season. In addition, surveyors reported generally higher abundances of migrants such as Warbling Vireos and Orange-crowned Warblers than seen at other PRBO woodland sites, but the overall species composition for the Algodones Dunes is much simpler than the migrant species composition seen at other PRBO woodland sites. This pattern may result from a real phenomenon where fewer species use the Algodones Dunes on migration, but in greater numbers than at other wash sites in the region. Conversely, it may signal that unknown migrants are more conservatively mis-identified as just a handful of the most common migrant species at these sites.

Trends

When working in Sonoran Desert microphyll woodland habitats, it is imperative to gather multiple years of data in order to account for high variation in weather conditions (CM *in prep*). While the Algodones Dunes data set accounts for wet, normal, and dry years of winter/spring precipitation, it will require additional years of sampling for trend analysis (described above). We recommend at least six, and perhaps seven consecutive years of spring point counts in order to measure potential trends in parameter estimates between open and closed areas.

Data Structure

The databases provided by the BLM for these analyses contained different structures, and there were multiple, unresolved species code errors. We were able to retrieve the information necessary for these analyses, but we recommend that the El Centro FO design a robust data structure and stick with it, to avoid the loss of data in future seasons. Species code errors are easily resolvable if the surveyors know proper codes and proof their data immediately after collection. Species code errors become much more difficult to resolve if an independent editor must try to decipher what the surveyor intended. All species codes can be found at <http://www.pwrc.usgs.gov/BBL/manual/sname.htm>.

APPENDIX A. Individual Species Frequencies, 2004-2007 (breeding species in bold)

Common Name	Scientific Name	Frequency
Mourning Dove	<i>Zenaida macroura</i>	1151
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	515
Brewer's Sparrow	<i>Spizella breweri</i>	372
Gambel's Quail	<i>Callipepla gambelii</i>	356
Black-tailed Gnatcatcher	<i>Poliophtila melanura</i>	265
Verdin	<i>Auriparus flaviceps</i>	241
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	208
Cactus Wren	<i>Campylorhynchus brunneicapillus</i>	188
Orange-crowned Warbler	<i>Vermivora celata</i>	132
Bullock's Oriole	<i>Icterus bullockii</i>	131
Warbling Vireo	<i>Vireo gilvus</i>	108
Nashville Warbler	<i>Vermivora ruficapilla</i>	105
Wilson's Warbler	<i>Wilsonia pusilla</i>	81
Ladder-backed Woodpecker	<i>Picoides scalaris</i>	78
Western Flycatcher	<i>Empidonax difficilis</i>	67
Brown-headed Cowbird	<i>Molothrus ater</i>	64
Loggerhead Shrike	<i>Lanius ludovicianus</i>	58
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	50
Western Kingbird	<i>Tyrannus verticalis</i>	49
White-winged Dove	<i>Zenaida asiatica</i>	45
LeConte's Thrasher	<i>Toxostoma lecontei</i>	44
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	40
Northern Mockingbird	<i>Mimus polyglottos</i>	39
Red-tailed Hawk	<i>Buteo jamaicensis</i>	29
Western Tanager	<i>Piranga ludoviciana</i>	29
Yellow-rumped Warbler	<i>Dendroica coronata</i>	27
Crissal Thrasher	<i>Toxostoma crissale</i>	24
Lesser Goldfinch	<i>Carduelis psaltria</i>	20
Great-horned Owl	<i>Bubo virginianus</i>	19
Greater Roadrunner	<i>Geococcyx californicus</i>	18
Townsend's Warbler	<i>Dendroica townsendi</i>	15
House Finch	<i>Carpodacus mexicanus</i>	13
Green-tailed Towhee	<i>Pipilo chlorurus</i>	12
Ruby-crowned Kinglet	<i>Regulus calendula</i>	10
House Wren	<i>Troglodytes aedon</i>	9
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	9
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	9
Costa's Hummingbird	<i>Calypte costae</i>	8

Phainopepla	<i>Phainopepla nitens</i>	8
Turkey Vulture	<i>Cathartes aura</i>	7
Chipping Sparrow	<i>Spizella passerina</i>	7
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>	6
Common Yellowthroat	<i>Geothlypis trichas</i>	6
Lazuli Bunting	<i>Passerina amoena</i>	6
Western Meadowlark	<i>Sturnella neglecta</i>	6
Lesser Nighthawk	<i>Chordeiles acutipennis</i>	5
Anna's Hummingbird	<i>Calypte anna</i>	5
Gray Flycatcher	<i>Empidonax wrightii</i>	5
Spotted Towhee	<i>Pipilo maculatus</i>	5
Calliope Hummingbird	<i>Stellula calliope</i>	4
Western Wood-pewee	<i>Contopus sordidulus</i>	4
<i>Empidonax</i> species	<i>Empidonax</i>	4
Yellow Warbler	<i>Dendroica petechia</i>	4
Black-throated Sparrow	<i>Amphispiza bilineata</i>	4
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	4
Rufous Hummingbird	<i>Selasphorus rufus</i>	3
Northern Flicker	<i>Colaptes auratus</i>	3
Cassin's Vireo	<i>Vireo cassinii</i>	3
Hermit Thrush	<i>Catharus guttatus</i>	3
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	3
Northern Harrier	<i>Circus cyaneus</i>	2
Cooper's Hawk	<i>Accipiter cooperii</i>	2
Gila Woodpecker	<i>Melanerpes uropygialis</i>	2
Swainson's Thrush	<i>Catharus ustulatus</i>	2
European Starling	<i>Sturnus vulgaris</i>	2
Lucy's Warbler	<i>Vermivora luciae</i>	2
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	2
Western Scrub-jay	<i>Aphelocoma californica</i>	1
Hermit Warbler	<i>Dendroica occidentalis</i>	1
Vesper Sparrow	<i>Pooecetes gramineus</i>	1
TOTAL SPECIES		70

APPENDIX B. Density Estimates Derived from Program DISTANCE

DENSITY ESTIMATES FROM PROGRAM DISTANCE.

DATA LABELS ARE AS FOLLOWS:

STRATA # 01 TO 04 ARE OHV FROM YEARS 2004-2007 RESPECTIVELY

STRATA # 05 TO 08 ARE NON-OHV FROM YEARS 2004-2007 RESPECTIVELY

DIFFERENCES WHERE THE CI DON'T OVERLAP (AND ARE SIGNIFICANT) ARE HIGHLIGHTED.

ATFL

		Estimate	%CV	df	95% Confidence Interval	
Stratum: 1						
Hazard/Hermite	D	0.77519E-01	25.84	141.59	0.46894E-01	0.12815
Stratum: 2						
Hazard/Hermite	D	0.10638	23.73	160.99	0.67000E-01	0.16889
Stratum: 3						
Hazard/Hermite	D	0.18109	71.42	89.77	0.50575E-01	0.64842
Stratum: 4						
Hazard/Hermite	D	0.94889E-01	23.59	199.83	0.59969E-01	0.15014
Stratum: 5						
Hazard/Hermite	D	0.64274E-01	18.98	213.80	0.44362E-01	0.93125E-01
Stratum: 6						
Hazard/Hermite	D	0.16811	66.86	61.28	0.49858E-01	0.56684
Stratum: 7						
Hazard/Hermite	D	0.56859E-01	21.50	264.89	0.37415E-01	0.86409E-01
Stratum: 8						
Hazard/Hermite	D	0.80180E-01	16.98	250.42	0.57529E-01	0.11175

BHCO

		Estimate	%CV	df	95% Confidence Interval	
Stratum: 1						
Hazard/Hermite	D	0.00000				
Stratum: 2						
Hazard/Hermite	D	0.28936E-01	82.69	12.61	0.60544E-02	0.13830
Stratum: 3						
Hazard/Hermite	D	0.32058E-01	113.46	11.45	0.43711E-02	0.23511
Stratum: 4						
Hazard/Hermite	D	0.72003E-02	81.12	10.16	0.14815E-02	0.34993E-01
Stratum: 5						
Hazard/Hermite	D	0.21101E-01	55.59	73.74	0.75030E-02	0.59341E-01
Stratum: 6						
Hazard/Hermite	D	0.87780E-02	77.81	16.20	0.20445E-02	0.37689E-01
Stratum: 7						
Hazard/Hermite	D	0.35905E-01	165.57	17.36	0.31937E-02	0.40367

Stratum: 8						
Hazard/Hermite	D	0.11330E-01	90.16	18.43	0.22474E-02	0.57121E-01

BRSP

		Estimate	%CV	df	95% Confidence Interval	

Stratum: 1						
Hazard/Hermite	D	0.15007	88.45	27.22	0.31560E-01	0.71361
Stratum: 2						
Hazard/Hermite	D	0.94774E-01	58.30	161.00	0.32566E-01	0.27581
Stratum: 3						
Hazard/Hermite	D	0.47302E-01	118.04	27.63	0.69714E-02	0.32096
Stratum: 4						
Hazard/Hermite	D	0.61170E-01	71.08	75.04	0.17112E-01	0.21866
Stratum: 5						
Hazard/Hermite	D	0.12011	43.73	185.35	0.52628E-01	0.27414
Stratum: 6						
Hazard/Hermite	D	0.64502E-01	44.54	197.99	0.27876E-01	0.14925
Stratum: 7						
Hazard/Hermite	D	0.34401	36.09	239.66	0.17267	0.68537
Stratum: 8						
Hazard/Hermite	D	0.75427E-01	65.78	204.31	0.23126E-01	0.24601

BTGN

		Estimate	%CV	df	95% Confidence Interval	

Stratum: 1						
Hazard/Hermite	D	0.21419	39.85	70.04	0.99593E-01	0.46064
Stratum: 2						
Hazard/Hermite	D	0.74667E-01	26.83	150.50	0.44351E-01	0.12571
Stratum: 3						
Hazard/Hermite	D	0.74896E-01	23.24	179.60	0.47634E-01	0.11776
Stratum: 4						
Hazard/Hermite	D	0.51516E-01	36.89	55.64	0.25185E-01	0.10537
Stratum: 5						
Hazard/Hermite	D	0.13557	24.52	114.91	0.84007E-01	0.21877
Stratum: 6						
Hazard/Hermite	D	0.35363E-01	66.45	13.56	0.96269E-02	0.12990
Stratum: 7						
Hazard/Hermite	D	0.59435E-01	28.63	96.59	0.34047E-01	0.10376
Stratum: 8						
Hazard/Hermite	D	0.13786	109.42	31.89	0.22619E-01	0.84029

BUOR

		Estimate	%CV	df	95% Confidence Interval	

Stratum: 1						
Hazard/Hermite	D	0.32703E-02	74.07	146.00	0.88495E-03	0.12085E-01
Stratum: 2						
Hazard/Hermite	D	0.54803	*****	5.01	0.11650E-02	257.80
Stratum: 3						
Hazard/Hermite	D	0.30803E-01	41.02	128.11	0.14116E-01	0.67214E-01
Stratum: 4						
Hazard/Hermite	D	0.54993E-01	47.96	191.60	0.22414E-01	0.13493
Stratum: 5						
Hazard/Hermite	D	0.11688E-01	77.90	26.73	0.28431E-02	0.48052E-01
Stratum: 6						
Hazard/Hermite	D	0.10010	85.70	161.00	0.23119E-01	0.43339
Stratum: 7						
Hazard/Hermite	D	0.39436E-01	59.83	127.13	0.13199E-01	0.11783
Stratum: 8						
Hazard/Hermite	D	0.64381E-01	38.70	224.25	0.30834E-01	0.13443

CACW

		Estimate	%CV	df	95% Confidence Interval	

Stratum: 1						
Hazard/Hermite	D	0.23256E-01	44.67	36.90	0.97991E-02	0.55191E-01
Stratum: 2						
Hazard/Hermite	D	0.15376	91.71	20.08	0.30148E-01	0.78423
Stratum: 3						
Hazard/Hermite	D	0.24604E-01	26.76	161.55	0.14638E-01	0.41355E-01
Stratum: 4						
Hazard/Hermite	D	0.22428E-01	31.16	116.07	0.12272E-01	0.40990E-01
Stratum: 5						
Hazard/Hermite	D	0.30833E-01	24.36	168.20	0.19194E-01	0.49530E-01
Stratum: 6						
Hazard/Hermite	D	0.63111E-01	30.07	145.90	0.35284E-01	0.11288
Stratum: 7						
Hazard/Hermite	D	0.29784E-01	24.86	218.42	0.18383E-01	0.48257E-01
Stratum: 8						
Hazard/Hermite	D	0.32152E-01	34.94	63.94	0.16321E-01	0.63337E-01

GAQU

		Estimate	%CV	df	95% Confidence Interval	
<hr/>						
Stratum: 1						
Hazard/Hermite	D	0.51713E-01	177.64	16.17	0.41276E-02	0.64791
Stratum: 2						
Hazard/Hermite	D	0.10098	37.66	187.36	0.49227E-01	0.20715
Stratum: 3						
Hazard/Hermite	D	0.36635E-01	46.82	192.34	0.15225E-01	0.88153E-01
Stratum: 4						
Hazard/Hermite	D	0.56933E-01	40.76	208.57	0.26287E-01	0.12331
Stratum: 5						
Hazard/Hermite	D	0.39351E-01	43.63	67.38	0.17104E-01	0.90531E-01
Stratum: 6						
Hazard/Hermite	D	0.74755E-01	34.28	149.40	0.38689E-01	0.14444
Stratum: 7						
Hazard/Hermite	D	0.16849	36.62	241.17	0.83777E-01	0.33885
Stratum: 8						
Hazard/Hermite	D	0.40067E-01	31.69	226.65	0.21779E-01	0.73712E-01

MODO

		Estimate	%CV	df	95% Confidence Interval	

Stratum: 1						
Hazard/Hermite	D	0.79577E-01	28.75	146.00	0.45593E-01	0.13889
Stratum: 2						
Hazard/Hermite	D	11.512	507.54	47.28	0.30022	441.47
Stratum: 3						
Hazard/Hermite	D	0.87813E-01	34.85	268.27	0.45093E-01	0.17101
Stratum: 4						
Hazard/Hermite	D	0.30386	29.77	352.66	0.17131	0.53896
Stratum: 5						
Hazard/Hermite	D	0.15962	44.65	151.39	0.68743E-01	0.37062
Stratum: 6						
Hazard/Hermite	D	0.16806	27.34	217.22	0.99011E-01	0.28527
Stratum: 7						
Hazard/Hermite	D	298.04	146.47	380.33	36.322	2445.6
Stratum: 8						
Hazard/Hermite	D	0.36912	27.51	424.70	0.21707	0.62767

OCWA

		Estimate	%CV	df	95% Confidence Interval	
<hr/>						
Stratum: 1						
Hazard/Hermite	D	0.54505E-01	99.66	146.00	0.10559E-01	0.28136
Stratum: 2						
Hazard/Hermite	D	0.20802E-01	111.88	4.18	0.17766E-02	0.24357
Stratum: 3						
Hazard/Hermite	D	0.61799E-01	50.22	48.23	0.23821E-01	0.16033
Stratum: 4						
Hazard/Hermite	D	0.72392E-01	67.29	147.38	0.21636E-01	0.24222
Stratum: 5						
Hazard/Hermite	D	0.54966E-01	83.80	20.59	0.12039E-01	0.25095
Stratum: 6						
Hazard/Hermite	D	0.75988E-01	56.76	52.92	0.26326E-01	0.21934
Stratum: 7						
Hazard/Hermite	D	0.20119	77.94	63.35	0.50784E-01	0.79701
Stratum: 8						
Hazard/Hermite	D	0.14274	47.49	94.99	0.58308E-01	0.34945

VERD

		Estimate	%CV	df	95% Confidence Interval	
<hr/>						
Stratum: 1						
Hazard/Hermite	D	0.63888E-01	28.15	118.21	0.36976E-01	0.11039
Stratum: 2						
Hazard/Hermite	D	0.35256E-01	39.08	67.14	0.16612E-01	0.74821E-01
Stratum: 3						
Hazard/Hermite	D	0.59338E-01	19.31	245.99	0.40709E-01	0.86491E-01
Stratum: 4						
Hazard/Hermite	D	0.11663E-01	60.63	18.23	0.36039E-02	0.37744E-01
Stratum: 5						
Hazard/Hermite	D	0.97656E-01	108.70	36.34	0.16294E-01	0.58530
Stratum: 6						
Hazard/Hermite	D	0.71179E-02	62.04	16.49	0.21295E-02	0.23791E-01
Stratum: 7						
Hazard/Hermite	D	0.48736E-01	27.26	140.71	0.28706E-01	0.82743E-01
Stratum: 8						
Hazard/Hermite	D	0.31160E-01	93.68	7.01	0.47722E-02	0.20346

WCSP

		Estimate	%CV	df	95% Confidence Interval	
Stratum: 1						
Hazard/Hermite	D	0.47573	73.96	84.77	0.12793	1.7692
Stratum: 2						
Hazard/Hermite	D	0.11300	74.92	142.60	0.30204E-01	0.42273
Stratum: 3						
Hazard/Hermite	D	0.81409E-01	99.11	198.00	0.15930E-01	0.41603
Stratum: 4						
Hazard/Hermite	D	0.44697E-01	152.64	6.09	0.30814E-02	0.64837
Stratum: 5						
Hazard/Hermite	D	0.55049E-01	43.20	137.33	0.24293E-01	0.12474
Stratum: 6						
Hazard/Hermite	D	0.80858	42.95	217.12	0.35939	1.8192
Stratum: 7						
Hazard/Hermite	D	0.76151E-01	100.00	208.00	0.14752E-01	0.39309
Stratum: 8						
Hazard/Hermite	D	0.42559E-01	119.06	4.60	0.35675E-02	0.50771

APPENDIX C. Breeding Species List Used in Analyses

Abert's Towhee
American Kestrel
Anna's Hummingbird
Ash-throated Flycatcher
Bell's Vireo
Bendire's thrasher
Black-chinned Hummingbird
Brown-headed Cowbird
Black-tailed Gnatcatcher
Black-throated Sparrow
Brown-crested Flycatcher
Bullock's Oriole
Cactus Wren
Canyon Wren
Costa's Hummingbird
Common Raven
Crissal Thrasher
Curve-billed Thrasher
Eurasian Collared-dove
Gambel's Quail
Great-horned Owl
Gila Woodpecker
Gilded Flicker
Greater Roadrunner
House Finch
Horned Lark
Ladder-backed Woodpecker
Lawrence's Goldfinch
LeConte's Thrasher
Lesser Goldfinch
Lesser Nighthawk
Loggerhead Shrike
Long-eared Owl
Lucy's Warbler
Mourning Dove
Northern Mockingbird
Northern Rough-winged Swallow
Phainopepla
Rock Wren
Red-tailed Hawk
Say's Phoebe
Verdin
Western Kingbird
Western Screech-owl
White-winged Dove

LITERATURE CITED

- ALLISON, P. D. 1991. Logistic regression using SAS system: theory and application. SAS Institute Inc.
- BALLARD, G. 2002. Pointcnt 2.75. Point Reyes Bird Observatory, Stinson Beach, CA.
<http://www.prbo.org/tools/>
- BUCKLAND, S. T., ANDERSON D. R., BURNHAM K. P., LAAKE J. L., BORCHERS D.L. and THOMAS L. 2001. Introduction to Distance Sampling: Estimating Abundance of Biological Populations. Oxford University Press, July 2001. 432pp.
- CAMERON, A.C. and TRIVEDI, P.K. (1998), *Regression Analysis of Count Data*, Econometric Society Monograph No.30, Cambridge University Press, 1998. 432 pp.
- ESRI. 2006. Arc Geographic Information System version 9.2. Environmental Systems Research Institute, Inc. Redlands, CA.
- FANCY, S.G. AND SAUER, J.R. 2000. Recommended methods for inventorying and monitoring landbirds in national parks. <http://science.nature.nps.gov/im/monitor/protocols/birds.htm>
- KREBS, C.J. 1989. Ecological methodology. Harper and Row Publishers, New York, New York: 654 pp.
- MACARTHUR, R.H. 1965. Patterns of species diversity. Biological Reviews 40:510-533.
- MCCREEDY, C. 2006. Xeric thorn woodland songbird project: 2005 progress report. PRBO Conservation Science (Contrib. 1534), 3820 Cypress Drive No.11, Petaluma, CA 94954.
- MCCREEDY, C. 2004. Xeric riparian songbird conservation: 2003 progress report. PRBO Conservation Science (Contrib. 1180), 3820 Cypress Drive No.11, Petaluma, CA 94954.
- NEW MEXICO DEPARTMENT OF GAME AND FISH. 2006. Comprehensive Wildlife Conservation Strategy for New Mexico. New Mexico Department of Game and Fish. Santa Fe, New Mexico. 526pp + appendices.
- NUR, N., JONES, S.L., AND GEUPEL, G.R. 1999. A statistical guide to data analysis of avian monitoring programs. U.S. Department of the Interior, Fish and Wildlife Service, BTP-R6001-1999, Washington D.C.
- PHILLIPS, S.J., AND COMUS, P.W. 2000. *A Natural History of the Sonoran Desert*. Arizona-Sonora Desert Museum Press. Tucson, AZ. 628pp.
- RALPH, C.J., GEUPEL, G. R., PYLE, P., MARTIN, T. E., AND DESANTE, D. F. 1993. Field methods for monitoring landbirds. USDA Forest Service Publication: PSW-GTR 144.

RALPH, C.J., DROEGE, S., AND SAUER, J.R. 1995. Monitoring bird populations by point counts. USDA Forest Service Publication: PSW-GTR-149.

SAS INSTITUTE. 2001. Version 8.2. SAS Institute, Cary, North Carolina, USA.

SOKAL, R. R. and ROHLF, F.J.. 1995. *Biometry: the principles and practice of statistics in biological research*. 3rd edition. W. H. Freeman and Co.: New York. 887 pp.

Reasonable Foreseeable Development Scenarios

Geothermal Energy RFD

It is expected that each of the pending geothermal lease sales could support a binary power plant with 50 mW of capacity; therefore, the reasonable foreseeable development (RFD) scenario for this lease-specific analysis is two binary power plants with a combined capacity of 100 mW. Each of the power plants would be expected to result in 25 acres of disturbance for a total disturbance of 50 acres.

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Exploration activities for the two 50-mW plants is expected to involve approximately 12 temperature gradient holes, disturbing approximately 0.15 acres each, for a total disturbance of approximately 2 acres. Disturbance would result from the types of activities described under Chapter 2, Phase One: Thermal Resource Exploration of the FFEIS for Geothermal Leasing (BLM 2004).

APPENDIX P

Assuming that commercially viable resources are found within both lease areas, drilling, construction, and development of the sites would be expected to result in an additional 16 acres of land disturbance (roughly 8 acres within each lease area) from the types of activities described in Chapter 2, Phase Two: Drilling Operations of the FFEIS.

Ultimately, the third phase of a geothermal project is expected to result in an additional 32 acres of land disturbance (roughly 16 acres at each lease area) from the types of activities described in Chapter 2, Phase Three: Utilization of the FFEIS.

The length and alignment of transmission lines are not estimated here, since these factors would depend upon the positioning of any power plant and the distance to the nearest electrical line.

Reclamation and abandonment of the fourth phase of a geothermal project is expected to result in temporary disturbance of all originally described areas, after which the site would be graded and revegetated to pre-disturbance conditions, as described in Chapter 2, Phase Four: Reclamation and Abandonment of the FFEIS.

Appendix D of the FFEIS provides the BLM and mitigation measures that should be applied during the approval process for geothermal leasing activities or in adjacent to the Flamingo Area.

The purpose of this appendix is to provide information regarding the potential impacts of geothermal energy development on the Flamingo Area and to provide information regarding the potential impacts of geothermal energy development on the Flamingo Area.

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APPENDIX B

Reasonable Foreseeable Development Scenarios

Geothermal Energy RFD

It is expected that each of the pending geothermal lease sites could support a binary power plant with 50 mW of capacity; therefore, the reasonable foreseeable development (RFD) scenario for this lease-specific analysis is two binary power plants with a combined capacity of 100 mW. Each of the power plants would be expected to result in 25 acres of disturbance for a total disturbance of 50 acres.

Exploration activities for the two 50-mW plants is expected to involve approximately 12 temperature gradient holes, disturbing approximately 0.15 acre each, for a total disturbance of approximately 2 acres. Disturbance would result from the types of activities described under Chapter 2, Phase One: Geothermal Resource Exploration, of the FPEIS for Geothermal Leasing in the Western US (BLM 2008f).

Assuming that commercially viable resources are found within both lease areas, drilling operations and development of the sites would be expected to result in an additional 16 acres of land disturbance (roughly 8 acres within each lease site) from the types of activities described in Chapter 2, Phase Two: Drilling Operations of the FPEIS.

Utilization, the third phase of a geothermal project, is expected to result in an additional 32 acres of land disturbance (roughly 16 acres at each lease site) from the types of activities described in Chapter 2, Phase Three: Utilization of the FPEIS.

The length and alignment of transmission lines are not estimated here, since these factors would depend upon the positioning of any power plant and the distance to the nearest electrical tie-in.

Reclamation and abandonment, the fourth phase of a geothermal project, is expected to result in temporary disturbance of all originally disturbed acres, after which, the site would be graded and revegetated to pre-disturbance conditions, as described in Chapter 2, Phase Four: Reclamation and Abandonment of the FPEIS.

Appendix D of the FPEIS presents the BMP and mitigation measures that would be applied during the approval process for geothermal leasing activities in or adjacent to the Planning Area.

Solar Energy RFD

The Energy Policy Act of 2005 (PL 109-58) requires that the BLM should seek to have at least 10,000 mW of non-hydropower renewable energy electricity approved on public lands by 2015. The BLM and the Department of Energy (DOE) have jointly identified utility-scale solar energy development as a potentially critical component in meeting these mandates. The agencies have further determined that the establishment of specific, agency-wide solar energy programs and related mitigation requirements constitute major federal actions, as defined by NEPA and, thus, have decided to jointly prepare a PEIS. A PEIS evaluates the environmental impacts of broad agency actions, such as the development of programs. The Solar Energy Development PEIS will focus on six western states (Arizona, California, Colorado, New Mexico, Nevada, and Utah) that have the greatest potential for solar energy development on federal lands. The specific agency-wide solar energy programs will consist of guidelines and mitigation requirements applicable, for DOE, to solar energy projects funded by DOE and, for BLM, to solar energy projects located on BLM-administered lands. Future site-specific environmental reviews are expected to be tiered to the PEIS and to be more effective and efficient because of the PEIS.

The two basic technologies typically used are CSP technologies and photovoltaic (PV) technologies. CSP technologies convert the light energy in sunlight to heat energy which is then used to perform work (e.g., heating water). Utility-scale CSP technologies use mirrors to concentrate the sun's rays to heat fluids or solids, and the heat is used to drive steam turbines or other devices to generate power. Parabolic trough and central tower systems typically use conventional steam plants to generate electricity; these plants commonly consume water for cooling. Some of the CSP technologies offer the potential to store the energy in the working fluid until demand from the grid calls for conversion to electrical energy. PV technologies convert the sun's radiant energy directly to electricity by using solar panels. The PV technologies do not have the capacity for direct storage. For newly constructed solar energy power plants, new or upgraded high-voltage transmission lines and associated facilities could be required.

PV cells are made of semiconductor material. When photons from sunlight are absorbed by a PV cell, the energy of the photons is transferred to electrons in the PV cell. As the electrons are freed, current begins to flow in the form of direct current (DC) electricity. Each PV panel is made of multiple cells that are put together with negative (sunny side) and positive (dark side) layers. In large-scale installations, many panels are assembled together to form arrays.

The technical specifications could differ somewhat from the description in this RFD depending upon the PV manufacture chosen. This is because the exact dimensions and precise quantities of solar components required to generate various mW of power differ between PV manufacturers. Assuming the use of a given thin-film PV technology, the PV

modules could be mounted on fixed structures and plugged together to form arrays or blocks. Pre-fabricated wire harnesses and combiner boxes connect the multiple arrays or blocks, provide safety protection, and deliver the DC power to an inverter. The inverter converts the DC power to alternating current (AC) power. The resulting lower AC voltage would be increased to a higher transmission voltage using transformers. A higher voltage provides significantly more efficient transmission of power. The power would then be transmitted to a substation for delivery to the electric grid.

Site Preparation

Depending on the location of a potential facility, large-scale grading of the site for construction and implementation could be avoided. A minimal level of ground disturbance should allow the site to maintain some of its natural characteristics and habitat value. However, PV blocks require a relatively flat surface for installation. Grading would occur for the construction of all-weather roads, temporary construction staging areas, a facility substation, and the facility administration facility. These areas would be graded, leveled, and graveled. Temporary use areas, including the staging areas and the temporary roads, would only be impacted during the construction period. Roads would be heavily used during construction and rarely used during operation. Staging areas would be utilized during the construction period, and would then be decommissioned and replanted with native vegetation.

A minor amount of grading would be necessary for approximately 200 square feet within each PV block where the transformer and inverter pad would be located. These transformer and inverter pads should add less than 1/10 of 1-percent surface impact from grading.

Trenching machines would be used to bury electrical cables within the PV blocks, and between the inverter and transformer locations and the substation. The cable laying and trench-refilling would occur as part of a single operation, thus minimizing grading impacts from this construction process. The trenches could be between 2 and 4 feet wide, and the trenching machines would disturb a corridor less than 15 feet in width during construction. Trenched corridors should maintain their existing surface contours. Trenching activities could result in site disturbance of approximately 5 percent of the facility site.

Solar Array Assembly and Construction

PV panels would be transported to the staging area in containers on tractor-trailers. From there, the containers would be transferred by crane onto smaller vehicles and brought to the construction location. The PV panels would be put in place manually and could be secured to concrete ballasts resting on grade. A row of panels then would be connected to a combiner box that would deliver power to the inverter box. Invertors and transformers would be installed at predetermined central locations and then connected

to incoming lines from the combiner boxes. Once PV block installation is completed, there should be only infrequent low-impact vehicular traffic for inspection and repair purposes on the aisle ways between PV blocks.

Solar arrays could consist of PV panels mounted on fixed steel support structures resting on steel posts. The general sequence of array assembly involves driving galvanized steel post into the ground, installing the fixed-angle galvanized steel tilt brackets, installing the galvanized steel PV panel support beams, and installing the PV panels.

The solar field could be comprised of PV panels mounted on fixed support structures arranged in 1-mW blocks. The solar field layout would comprise rows of panels oriented from east to west, with the panels facing the south. The spacing between rows would be approximately 8 feet. Each 1-mW block could have exterior dimensions of approximately 420 feet by 711 feet. These blocks would be adjacent to each other or separated by all-weather roads. A 20-foot all-weather road could be provided around the perimeter of each section for maintenance purposes. An inverter structure and transformer would be placed at the center of each 1-mW block. The prefabricated inverter structures could be approximately 14 feet by 12 feet and house the inverters and associated electrical equipment. The transformer would be located adjacent to the inverter housing. A 12-foot all-weather road would be constructed to each inverter housing in each 1-mW block.

Electricity from each block could be transmitted by underground cables to collector buildings. Each collector building could be an 8- by 60-foot pre-fabricated building. An all weather road would be needed for each building for maintenance purposes. An approximate 5,000-square-foot administration and control building would also be constructed. Electricity from each collector building could be transmitted by either above ground or underground cables to a new substation to be located on site. This substation could require a maximum of 10 acres.

Temporary facilities would be required during construction and include construction trailers and parking areas. An estimated 40 to 50 acres would be required for staging construction materials. The staging area would be fenced for security and may include crushed rock surfacing. The staging areas would be located within the solar array footprint and could be relocated as construction commences within different areas.

Concrete would be required for PV panel frame ballasts when used as a construction technique. On-site concrete batch plants would be set up in the staging areas to produce these ballasts. Concrete from these plants could also be used to create foundations and pads for inverters, transformers, and substation equipment.

The installation of the solar power facilities and associated infrastructure, including transmission facilities and permanent access and maintenance roads, could result in the complete removal of vegetation. Native vegetation in the form of seeds, cuttings, and

plants could be stockpiled during site clearance for the post construction re-vegetation. Most areas where solar panels and other ancillary infrastructure are placed would not be re-vegetated. Measures to prevent the propagation and spreading of noxious weeds and other non-native vegetation would be taken during grading, construction, and operation of the facility.

The perimeter of the site would be secured with a chain link fence topped with barbed wire. All buildings would be secured with locks on the doors.

To reduce the impact of clearing and grading operations, BMP would be used based on soil and surface conditions. Surface water drainage patterns could be altered on the site due to grading. However, runoff would be properly managed to avoid erosion or increased flooding in the project area. A site drainage management plan would be developed detailing an erosion control strategy using native plant species and drainage management structures and techniques.

Operation and Maintenance

The PV panels, structures, and electrical distribution system would require minimal maintenance. Periodic maintenance activities may include washing of the PV panel surfaces. However, further study into the performance reduction would be required to establish cleaning intervals. Other periodic maintenance activities would include maintenance of the transformers. The majority of the site roads would be traveled infrequently and will be re-graded and maintained as needed.

Although PV technology does not utilize any water to produce electricity, the facility would require some water on an ongoing basis for cleaning the installed PV panels. It is anticipated that no more than 100 acre-feet per section (640 acres) per year for cleaning purposes and the actual amount required could be substantially less. Additionally, water would be necessary for grading and compaction at the site and for dust control during construction.

Vegetation on the site could be cut back mechanically to allow for installation and to prevent shading of the solar panels. Vegetative debris could be shredded and distributed in place. Native vegetation is expected to re-grow both between and under the rows of PV panels. Vegetation would be periodically re-cut over the life of the facility to prevent shading of the panels.

It is anticipated that each PV panel supplier would have a recycling program. Each supplier should provide for packaging and transportation of modules to their recycling center.

Wind Energy RFD

In June 2005, BLM filed the FPEIS on Wind Energy Development on BLM-administered Lands in the Western United States (Wind Energy FPEIS). Those portions of the Wind Energy FPEIS that are applicable to the Planning Area are hereby incorporated by reference in accordance with 40 CFR 1502.21. The CDCA Plan adopted the BMP from the Wind Energy Development FPEIS.

Chapter 3, Overview of Wind Energy Projects, in the Wind Energy FPEIS describes the activities likely to occur during each of the major phases associated with the development of a wind energy project: site testing and monitoring, construction, operation, and decommissioning, including applicable mitigation.

Appendix D, Wind Energy Technology Overview, in the Wind Energy FPEIS includes discussions of terminology, turbine design, existing commercial wind projects, and research and development a potential applicant could use in developing a plan of development for a ROW application in or adjacent to the Planning Area.

Camping Pad Construction RFD

Visitors who camp outside of a pad area due to limited available space often get stuck in sand, thereby causing a hazard to themselves and others. Also, due to the limited camping pad space, visitors tend to park close to the road, which can result in damage to the road shoulder, difficult enforcement of the parking rules, and a safety hazard to pedestrians.

Camping pad construction would typically include the following activities:

- Grading, watering, and compacting the subsurface material
- Moving sand on and adjacent to the project site
- Installing a geo-textile material
- Applying approximately nine inches of aggregate base material

Each pad would consist of three layers: a compacted sand base using a grader and water spread by a water truck, installation of a geo-textile web material, and deposition of approximately nine inches of compacted aggregate base brought in by dump truck and compacted using a grader and water spread by a water truck. All construction would be inspected by BLM engineering staff. Dust suppression materials would be applied during the construction phase and would follow Best Available Control Measures for

Fugitive Dust found in the most current ICAPCD's Rule 805. Construction would take approximately two months to complete.

Vault Toilet Construction RFD

During the recreation season, BLM contracts with a vendor to provide portable toilets within recreation areas that are not yet developed. In developing these recreation areas, the construction of permanent vault toilet units would reduce administrative time, cost for contracts, and would provide year-round facilities in the area. Overall, permanent vault toilets would reduce time, labor, and administrative costs over the life of the toilets. At full capacity, each toilet would safely store 30,000 gallons of refuse. With pumping occurring three to four times a year, 90,000 to 120,000 gallons of refuse would be contained instead of deposited in the dune environment. In comparison, each portable toilet (currently used) holds only 35 gallons, is pumped daily, and is used only five weekends a season. Comparing the cost of the permanent toilets to the current portable toilet contract, the vault toilets would pay for themselves in 5 years. Construction of vault toilets would provide a healthier and more enjoyable experience for the visitor, encourage dispersed use to remote sites, and result in a reduction of illegal dumping of effluent material.

Vault toilet construction would include the following activities:

- A backhoe would be used to dig a hole (4.25 feet deep by 16 feet long by 13 feet wide) for each unit.
- A semi-tractor trailer would be used to deliver the toilets to the construction site.
- The 810 cubic feet of displaced sand would then be used to backfill around the toilets, and build up the surrounding areas.
- All the sites would be properly contoured to achieve natural terrain feature and encourage natural revegetation.
- The toilets would be located on BLM-administered lands in the Planning Area.

All sites would be constructed adjacent to existing roads and located in heavily impacted areas already used for camping. Toilets would be placed so that native vegetation would not be harmed during construction activities. The toilets along Wash Road would be located on high ground and away from washes to ensure that the toilets would not be flooded.

Road Construction RFD

The BLM would consider new access road construction in the Planning Area when needed (and as funding becomes available) to facilitate greater and improved access. New roads would provide street-legal vehicle access for camping associated with OHV recreation to previously inaccessible areas of the Planning Area. New access roads could traverse hard pan desert, active sand dunes, ephemeral streams (dry washes), and could be constructed in phases to address funding needs. Major access routes would be two-lane roads (32 feet wide, including the shoulders).

BLM would use natural material from a local gravel pit approximately two miles from the eastern edge of the Planning Area, north of SR-78. Spoils from project sites would be deposited no farther than 100 feet away from the new road edge and either downstream or downwind whenever possible. Spoils would be evenly distributed to blend in with the natural environment, would not significantly alter ephemeral stream course, and would not pose a significant safety risk to OHV recreationalists in the area.

New road construction would consist of the following:

- Use graders, water tanker trucks, dump trucks, rollers, dozers, loaders, and other administrative vehicles.
- Grade and compact a new road base in the existing natural material base.
- Excavate soft sand at dry sand wash crossings and refill with class II road base material.
- Lay a geo-textile fabric over natural material then import, distribute, water, level, and compact a minimum of 9 inches of road base material over the geo-textile material.
- Apply dust suppression materials during construction phase and would follow Best Available Control measures found in the most current ICAPCD's Rule 805.

After construction has been completed, BLM would need to perform periodic maintenance of access roads. Maintenance could include rebuilding damaged road sections, moving windblown sand, watering, and compacting. Levels of maintenance would be dependent upon the level of development on the road. Generally, less development would require more maintenance, while higher levels of development would require less maintenance.

Signs would also be installed along the road shoulder, indicating a speed limit to increase safety and reduce dust. Additional signs could be placed intermittently to advise visitors of other rules, regulations, and information in the Planning Area. Signs would consist of single fiberglass posts or metal C-channel posts, which are pounded into the

ground by hand or hydraulic hammer. An informational kiosk would be installed at initial access points. The kiosk would require two cement foundations, 2 feet in diameter and 3 feet deep. Information about the dunes, including safety and resource conservation information, would be posted at the kiosk.

Separate fee collection areas may also be needed. A fee collection facility would be in the form of additional hard-packed pull-through areas (up to five lanes). The proposed fee collection facility would also facilitate safe ingress and egress for visitors paying fees, as well as the staff involved in fee collection. In order to control the flow of traffic, BLM could install traffic control devices along private property boundaries.

In addition, trash collection facilities in the form of additional hard-packed, pull-through areas adjacent to new roads could be constructed. Each trash collection facility would be constructed to facilitate safe ingress and egress for visitors disposing of trash.

In future years, and when funding becomes available, BLM would like to pave access roads to reduce maintenance and improve air quality. Paving could reduce ephemeral stream erosion during flash flood events and assist Imperial County in meeting the objectives set forth in the County's Dust Plan.

South Dunes Infrastructure RFD

If funding allows, a large development in the Dunes Vista or Ogilby area could take place to accommodate displaced visitors when the Dunebuggy Flats area is closed during years where the precipitation trigger is exceeded. The development could include a combination of road, toilet, and camping pad developments as described above. A new fee collection area, trash collection facilities, controlled access, paved entry road, campgrounds, and a contact station could be constructed to manage traffic and create a safe and controlled recreational experience.

Concessions RFD

Concession leases authorize the operation of recreation-oriented services and facilities by the private sector on BLM-administered lands and in support of BLM recreation programs. Concessionaires are authorized through a concession lease, which is administered on a regular basis and which requires the concessionaire to pay fees in exchange for the opportunity to carry out business activities. For example, many services in National Parks are provided by concessionaires rather than by individual vendors, and many of the management activities are often provided by the concessionaire rather than by the managing agency.

BLM has entered into a contract agreement with a private entity to manage the fee collection program. The vendor supplies and maintains the automated pay stations, collects the funds, and periodically pays the BLM a percentage of the revenue on a sliding scale based on the gross revenue. The contract for fee collection is a small step toward a concession program, under which a private contractor would manage some of the programs within the Planning Area, or provide goods or services under a contract with the BLM.

BLM is exploring the possibility of a more active concession program. Various aspects of management for portions of the entire project may be suitable for private or other government entity management. However, law enforcement for the Planning Area would remain with the BLM. Under this scenario, the concessionaire would provide staff and other resources at cost and profit basis, or for a percentage of the gross revenues. Some of the most common concessionaire activities would include: establishing controlled access points, development at main entry points, and management of concession or vendor services.

All concessionaire proposed developments would require BLM approval of a POD prior to any surface-disturbing activities could occur.

Controlled Access Points

Access points would be limited to five or six locations: Mammoth Wash, Gecko Road, Wash Road, Dune Buggy Flats, Buttercup, and possibly Ogilby Road. Main access road construction and maintenance would occur as described in the Road Construction RFD described in this appendix. Each access point would require a permanent fee collection facility. Fee collection facilities would be in the form of additional hard-packed pull-through areas (up to five lanes). The proposed fee collection facility would also facilitate safe ingress and egress for visitors paying fees, as well as the staff involved in fee collection. In order to control the flow of traffic, the concessionaire could install traffic control devices along private property boundaries. In addition to fee collections, a reservation system could be developed leading to pre-assignment of campsites.

Developments at Main Entry Points

Development at entry points would likely increase over time. Basic development would likely consist of concessionaire office facilities and concession or vendor service facilities. Office facilities could include construction of a modular building or placement of an office trailer for concessionaire staff. Concession or vendor service facilities could include, but are not limited to: stores, vehicle repair facilities, an RV dump station, internet access using WIFI, and retail sales structures. Each of these facilities would require development of some basic infrastructure such as water, sewer, electrical, staff parking, and possibly overnight facilities for staff. WIFI internet access would require a tower.

Management of Concession or Vendor Services

Concession and vendor services requiring management include but are not limited to: fee collection, trash collection, servicing of vault toilets, road and camping pad maintenance (see Road Construction and Camping Pad RFDs described in this appendix), emergency services, and retail vending. Management would require appropriate staffing and procurement of needed services.

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Glossary of Terms

A

Adverse visual impact: any modification in land forms, water bodies, or vegetation, or any introduction of structures, which negatively interrupts the visual character of the landscape and disrupts the harmony of the basic elements (i.e., form, line, color, and texture).

(A)esthetics: relates to the pleasurable characteristics of a physical environment as perceived through the five senses of sight, sound, smell, taste, and touch.

Archaeological feature: A non-portable object, not recoverable from its matrix (usually in an archeological site) without destroying its integrity. Examples are rock paintings, hearths, post holes, floors, and walls.

Archaeological district: A significant concentration, linkage, or continuity of sites, buildings, or features important in history or prehistory. There can be discontinuous districts composed of resources that are not in close proximity to one another

Area of Critical Environmental Concern (ACEC): A designated area on public lands where special management attention is required: 1) to protect and prevent irreparable damage to fish and wildlife; 2) to protect important historic, cultural, or scenic values, or other natural systems or processes; or 3) to protect life and safety from natural hazards.

Avoidance area: An area only available for the stated activity or discretionary land use authorization when there are no other reasonable alternatives for the authorization.

B

Basic elements: The four design elements (form, line, color, and texture), which determine how the character of a landscape is perceived.

C

Characteristic: A distinguishing trait, feature, or quality.

Characteristic landscape: The established landscape within an area being viewed. This does not necessarily mean a naturalistic character. It could refer to an agricultural

setting, an urban landscape, a primarily natural environment, or a combination of these types.

Contrast: Opposition or unlikeness of different forms, lines, colors, or textures in a landscape.

Contrast rating: A method of analyzing the potential visual impacts of proposed management activities.

Critical habitat (designated): Specific parts of an area that are occupied by a federally listed or endangered plant or animal at the time it is listed and that contain physical or biological features essential to the conservation of the species or that may require special management or protection. Critical habitat may also include specific area outside an area occupied by a federally listed species, if the Secretary of the Interior determines that these areas are essential for conserving the species.

Cultural modification: Any human-caused change in the land form, water form, vegetation, or the addition of a structure which creates a visual contrast in the basic elements (form, line, color, texture) of the naturalistic character of a landscape.

Cultural resource: A location of human activity, occupation, or use identifiable through field inventory, historical documentation, or oral evidence. Cultural resources include archaeological and historical sites, structures, buildings, objects, artifacts, works of art, architecture, and natural features that were important in past human events. They may consist of physical remains or areas where significant human events occurred, even though evidence of the events no longer remains. And they may include definite locations of traditional, cultural, or religious importance to specified social or cultural groups.

Cultural resource data: Cultural resource information embodied in material remains such as artifacts, features, organic materials, and other remnants of past activities. An important aspect of data is context, a concept that refers to the relationships among these types of materials and the situations in which they are found.

Cultural resource data recovery: The professional application of scientific techniques of controlled observation, collection, excavation, and/or removal of physical remains, including analysis, interpretation, explanation, and preservation of recovered remains and associated records in an appropriate curatorial facility used as a means of protection. Data recovery may sometimes employ professional collection of such data as oral histories, genealogies, folklore, and related information to portray the social significance of the affected resources. Such data recovery is sometimes used as a measure to mitigate the adverse impacts of a ground-disturbing project or activity.

Cultural resource integrity: The condition of a cultural property, its capacity to yield scientific data, and its ability to convey its historical significance. Integrity may reflect the authenticity of a property's historic identity, evidenced by the survival or physical characteristics that existed during its historic or prehistoric period, or its expression of the aesthetic or historic sense of a particular period of time.

Cultural resource inventory (survey): A descriptive listing and documentation, including photographs and maps of cultural resources. Included in an inventory are the processes of locating, identifying, and recording sites, structures, buildings, objects, and districts through library and archival research, information from persons knowledgeable about cultural resources, and on-the-ground surveys of varying intensity.

Class I: A professionally prepared study that compiles, analyzes, and synthesizes all available data on an area's cultural resources. Information sources for this study include published and unpublished documents, BLM inventory records, institutional site files, and state and National Register files. Class I inventories may have prehistoric, historic, and ethnological and sociological elements. These inventories are periodically updated to include new data from other studies and Class II and III inventories.

Class II: A professionally conducted, statistically based sample survey designed to describe the probable density, diversity, and distribution of cultural properties in a large area. This survey is achieved by projecting the results of an intensive survey carried out over limited parts of the target area. Within individual sample units, survey aims, methods, and intensities are the same as those applied in Class III inventories. To improve statistical reliability, Class II inventories may be conducted in several phases with different sample designs.

Class III: A professionally conducted intensive survey of an entire target area aimed at locating and recording all visible cultural properties. In a Class III survey, trained observers commonly conduct systematic inspections by walking a series of close-interval parallel transects until they have thoroughly examined an area.

Cultural resource values: The irreplaceable qualities that are embodied in cultural resources, such as scientific information about prehistory and history, cultural significance to Native Americans and other groups, and the potential to enhance public education and enjoyment of the Nation's rich cultural heritage.

Cultural site: A physical location of past human activities or events, more commonly referred to as an archaeological site or a historic property. Such sites vary greatly in size and range from the location of a single cultural resource object to a cluster of cultural resource structures with associated objects and features.

D

De minimis condition: An environmental condition that does not generally present a material risk of harm to the public health or the environment and that generally would not be subject to an enforcement action if brought to the attention of appropriate government agencies.

Distance zones: A subdivision of the landscape as viewed from an observer position. The subdivision (zones) includes foreground-middleground, background, and seldom seen.

E

Endangered species: An animal or plant species that is in danger of extinction throughout all or a significant portion of its range (as defined in the ESA, as amended in 1982).

Endemic species: A plant or animal species or subspecies native to a small region.

Enhancement: A management action designed to improve visual quality.

Entry: When the register of a local land office “enters” land applications in the record books and on the survey plat of the local office. (taken from Opportunity and Challenge, the Story of BLM)

Exclusion area: An area that is not available for the stated activity or discretionary land use authorization.

Exotic species: A species of plant or animal that is not native to the area where it is found. Any species that is not indigenous, native, or naturalized.

Extensive Recreation Management Area (ERMA): An area that emphasizes the traditional dispersed recreation use of public lands. ERMAs have an undeveloped character that allows visitors to escape crowds, rely on their own skills and equipment for recreation pursuits, and freedom from stricter regulations. All lands that are not within a designated SRMA revert to the ERMA category. BLM actions in ERMAs are limited to custodial actions and therefore do not require an implementation-level plan.

F

Foreground-middleground distance zones: The area visible from a travel route, use area, or other observation point to a distance of 3 to 5 miles. The outer boundary of this

zone is defined as the point where the texture and form of individual plants are no longer apparent in the landscape. Vegetation is apparent only in patterns or outline.

Form: The mass or shape of an object or objects which appear unified, such as a vegetative opening in a forest, a cliff formation, or a water tank.

Free use permit: A permit that is generally issued to a governmental entity (e.g. state, county, or city) that allows the removal of mineral materials from the public lands free of charge.

G

Geothermal resources: Products of geothermal steam or hot water and hot brines, including those resulting from water, gas, or other fluids artificially introduced into geothermal formations; heat or other associated energy found in geothermal formations; and associated byproducts (43 CFR 3200.1).

H

Habitat fragmentation: Process by which habitats are increasingly subdivided into smaller units resulting in their increased insularity and loss of total habitat area.

Historical site: A location that was used or occupied after the arrival of Europeans in North America (ca. 458 BP). Such sites may consist of physical remains at archaeological sites or areas where significant human events occurred, even though evidence of the events no longer remains. They may have been used by people of either European or Native American descent.

I

Indian tribe: Any American Indian group in the US that the Secretary of the Interior recognizes as possessing tribal status (listed periodically in the Federal Register).

Indigenous: Being of native origin (such as indigenous peoples or indigenous cultural features).

Interdisciplinary team: A group of individuals with different training, representing the physical sciences, social sciences, and environmental design arts, assembled to solve a problem or perform a task. The members of the team proceed to a solution with frequent interaction so that each discipline may provide insights to any stage of the problem and disciplines may combine to provide new solutions.

Invasive non-native plant: A plant species that was introduced to the ecosystem under consideration after European contact as a direct or indirect result of human activity and that produces large numbers of offspring at considerable distances from parent plants.

J

K

Key observation point (KOP): one or a series of points on a travel route or at a use area or a potential use area, where the view of a management activity would be most revealing.

L

Landscape character: The arrangement of a particular landscape as formed by the variety and intensity of the landscape features and the four basic elements of form, line, color, and texture. These factors give the area a distinctive quality which distinguishes it from its immediate surroundings.

Landscape features: The land and water form, vegetation, and structures which compose the characteristic landscape.

Leasable minerals: Minerals whose extraction from federally managed land requires a lease and the payment of royalties. Leasable minerals include coal, oil and gas, oil shale and tar sands potash, phosphate, sodium, and geothermal steam.

Line: The path, real or imagined, that the eye follows when perceiving abrupt differences in form, color, or texture. Within landscapes, lines may be found as ridges, skylines, structures, changes in vegetative types, or individual trees and branches.

Locatable minerals: Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Law of 1872, as amended. This includes deposits of gold, silver, and other uncommon minerals not subject to lease or sale.

M

Management activity: A surface disturbing activity undertaken on the landscape for the purpose of harvesting, traversing, transporting, protecting, changing, replenishing, or otherwise using resources.

Microphyll woodland: A desert wash community that consists of deciduous, deep-rooted shrubs and trees.

Mineral material disposal: The sale of sand, gravel, decorative rock, or other materials defined in 43 CFR 3600.

Mining claim: A mining claim is a selected parcel of federal land, valuable for a specific mineral deposit or deposits, for which a right of possession has been asserted under the General Mining Law. This right is restricted to the development and extraction of a mineral deposit. The rights granted by a mining claim protect against a challenge by the US and other claimants only after the discovery of a valuable mineral deposit. The two types of mining claims are lode and placer. In addition, mill sites and tunnel sites may be located to provide support facilities for lode and placer mining.

Mitigation: Mitigation includes: a) avoiding the impacts altogether by not taking an action or parts of an action, b) minimizing impacts by limiting the degree or magnitude of the action and its implementation, c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment, d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action, e) compensating for the impact by replacing or providing substitute resources or environments (40 CFR 1508.20).

N

National Historic Preservation Act of 1966, as amended: A federal statute that established a federal program to further the efforts of private agencies and individuals in preserving the nation's historic and cultural foundations. The National Historic Preservation Act:: 1) authorized the National Register of Historic Places, 2) established the Advisory Council on Historic Preservation and a National Trust Fund to administer grants for historic preservation, and 3) authorized the development of regulations to require federal agencies to consider the effects of federally assisted activities on properties included on or eligible for the National Register of Historic Places. Also see National Register of Historic Places.

National Register of Historic Places: The official list, established by the National Historic Preservation Act, of the Nation's cultural resources worthy of preservation. The National Register lists archeological, historic, and architectural properties (i.e., districts, sites, buildings, structures, and objects) nominated for their local, state, or national significance by state and federal agencies and approved by the National Register Staff. The National Park Service maintains the National Register. Also see National Historic Preservation Act.

National Register Eligible Properties: Cultural resource properties that meet the National Register criteria and have been determined eligible for nomination to the National Register of Historic Places because of their local, state, or national significance. Eligible properties generally are older than 50 years and have retained their integrity. They meet one or more of four criteria: a) associated with events that have made a significant contribution to the broad patterns of our history; b) associated with the lives of persons significant in our past; c) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master; and d) have yielded, or may be likely to yield, information important in prehistory or history.

Naturalistic character: A landscape setting where the basic elements are displayed in a composition that appears unaltered by man.

Noxious weed: According to the Federal Noxious Weed Act (PL 93-629), a weed that causes disease or has other adverse effects on man or his environment and therefore is detrimental to the agricultural and commerce of the US and to the public health.

No surface occupancy (NSO): A fluid mineral leasing stipulation that prohibits occupancy or disturbance on all or part of the lease surface to protect special values of uses. Lessees may explore for or exploit the fluid minerals under leases restricted by this stipulation by using directional drilling from sites outside the no surface occupancy area.

O

Off-highway vehicle (OHV): Any vehicle capable of or designed for travel on or immediately over land, water, or other natural terrain, deriving motive power from any source other than muscle. OHVs exclude: 1) any non-amphibious registered motorboat; 2) any fire, emergency, or law enforcement vehicle while being used for official or emergency purposes; 3) any vehicle whose use is expressly authorized by a permit, lease, license, agreement, or contract issued by an authorized officer or otherwise approved; 4) vehicles in official use; and 5) any combat or combat support vehicle when used in times of national defense emergencies.

P

Paleontological resources (fossils): The physical remains of plants and animals preserved in soils and sedimentary rock formations. Paleontological resources are important for understanding past environments, environmental change, and the evolution of life.

Paleontology: A science dealing with the life forms of past geological periods as known from fossil remains.

Paleozoic Era: An era of geologic time (600 million to 280 million years ago) between the Late Precambrian and the Mesozoic eras and comprising the Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, and Permian periods.

Petroglyph: Pictures, symbols, or other art work pecked, carved, or incised on natural rock surfaces.

Prehistoric: Refers to the period wherein American Indian cultural activities took place before written records and not yet influenced by contact with non-native culture(s).

Q

R

Rare plant: A plant that is not presently threatened with extinction but exists in such small numbers throughout its range that it may become endangered if its present environment worsens.

Recreation Management Zones (RMZ): Subunits within an SRMA managed for distinctly different recreation products. Recreation products are comprised of recreation opportunities, the natural resource and community settings within which they occur, and the administrative and service environment created by all affecting recreation-tourism providers, within which recreation participation occurs.

Rehabilitation: A management alternative and/or practice which restores landscapes to a desired scenic quality.

Restoration (cultural resource): The process of accurately reestablishing the form and details of a property or portion of a property together with its setting, as it appeared in a particular period of time. Restoration may involve removing later work that is not in itself significant and replacing missing original work.

Right-of-way (ROW) corridor: A permit or easement that authorizes the use of lands for certain specified purposes, commonly for pipelines, roads, telephone lines, or powerlines.

Riparian: Pertaining to or situated on or along the bank of a stream, lake, or reservoir.

Road: A linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.

Route: A group or set of roads, trails, and primitive roads that represents less than 100% of the BLM transportation system. Generically, components of the transportation system are described as routes.

RS 2477: Revised Statute 2477 was enacted as part of the Mining Law of 1866, during a time when the federal government's focus was on encouraging settlement and development of the West. Congress passed RS 2477 to ensure miners' routes to their claims and cattlemen's trails for their herds by granting ROWs over any federal land not otherwise set aside. Although Congress repealed the statute in 1976 with the Federal Land Policy and Management Act, it did not terminate ROWs in existence at that time. As part of the new law in 1976, Congress recognized all valid existing claims to these ROWs as of that date.

S

Saleable minerals: Common variety minerals on the public lands, such as sand and gravel, which are used mainly for construction and are disposed by sales or special permits to local governments. See also Mineral Materials.

Scale: The proportionate size relationship between an object and the surroundings in which the object is placed.

Scenery: The aggregate of features that give character to a landscape.

Scenic area: An area whose landscape character exhibits a high degree of variety and harmony among the basic elements which results in a pleasant landscape to view.

Scenic quality: The relative worth of a landscape from a visual perception point of view.

Scenic Quality Evaluation Key Factors: The seven factors (land form, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications) used to evaluate the scenic quality of a landscape.

Scenic quality ratings: The relative scenic quality (A, B, or C) assigned a landscape by applying the scenic quality evaluation key factors; scenic quality A being the highest rating, B a moderate rating, and C the lowest rating.

Scenic values: See Scenic quality and Scenic quality ratings.

Sensitive species (plant and animal): Species that are under status review, have small or declining populations, live in unique habitats, or need special management. Sensitive species include threatened, endangered, and proposed species that are classified by the USFWS.

Sensitivity levels: Measures (e.g., high, medium, and low) of public concern for the maintenance of scenic quality.

Solitude: Circumstance in which the sights, sounds, and evidence of other people are rare or infrequent and where visitors can be isolated, alone, or secluded from others.

Special Recreation Management Area (SRMA): A public lands unit identified in land use plans to direct recreation funding and personnel to fulfill commitments made to provide specific, structured recreation opportunities (i.e., activity, experience, and benefit opportunities). Both land use plan decisions and subsequent implementing actions for recreation in each SRMA are geared to a strategically identified primary market—destination, community, or undeveloped.

State Historic Preservation Officer (SHPO): The official within and authorized by each state at the request of the Secretary of the Interior to act as liaison for the National Historic Preservation Act. Also see National Historic Preservation Act.

Subsurface: Of or pertaining to rock or mineral deposits which generally are found below the ground surface.

Surface-disturbing activities: This term generally refers to any BLM-authorized action that disturbs vegetation and surface soil, increasing erosion potential above normal site conditions. This definition typically excludes allowable casual use of the public lands, as outlined in the CFRs. Examples of surface-disturbing activities are mining; construction and/or maintenance of roads, pipelines, and powerlines; installation of facilities; and implementation of vegetation treatments.

Surface occupancy: See No Surface Occupancy.

T

Take: To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (ESA).

Texture: The visual manifestations of the interplay of light and shadow created by the variations in the surface of an object or landscape.

Threatened species: Any plant or animal species likely to become endangered within the foreseeable future throughout all or part of its range and designated by the USFWS under the ESA.

U

V

Variables: Factors influencing visual perception including distance, angle of observation, time, size or scale, season of the year, light, and atmospheric conditions.

Variety: The state or quality of being varied and having the absence of monotony or sameness.

Viewshed: The landscape that can be directly seen under favorable atmospheric conditions, from a viewpoint or along a transportation corridor. Protection, rehabilitation, or enhancement is desirable and possible.

Visual contrast: See Contrast.

Visual quality: See Scenic quality.

Visual resources: The visible physical features on a landscape (e.g., land, water, vegetation, animals, structures, and other features).

Visual resource management (VRM): The inventory and planning actions taken to identify visual values and to establish objectives for managing those values; and the management actions taken to achieve the visual management objectives.

Visual resource management classes: Categories assigned to public lands based on scenic quality, sensitivity level, and distance zones. There are four classes, each of which has an objective which prescribes the amount of change allowed in the characteristic landscape.

Visual values: See Scenic quality.

W

Wilderness area: An area formally designated by Congress as part of the National Wilderness Preservation System as defined in the Wilderness Act of 1964 (78 Stat.891), Section 2(c).

Wilderness characteristics: Features of the land associated with the concept of wilderness that may be considered in land use planning when BLM determines that those characteristics are reasonably present, of sufficient value (condition, uniqueness, relevance, importance) and need (trend, risk), and are practical to manage. Lands are

considered to maintain wilderness characteristics when opportunities to experience naturalness, solitude, or primitive and unconfined types of recreation are reasonable present.

Wilderness study area: A roadless area or island that has been inventoried and found to have wilderness characteristics as described in section 603 of FLPMA and section 2(c) of the Wilderness Act of 1964 (78 Stat. 891). Source for both of these is BLM's IMP and Guidelines for Lands Under Wilderness Review (December 1979).

Wildlife improvement projects: these include, but are not limited to the installation of wildlife waters (guzzlers) and habitat restoration.

X

Y

Z

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Acronyms

AC	alternating current
ACEC	Area of Critical Environmental Concern
ADA	Americans with Disabilities Act
ASA	American Sand Association
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
ATV	all-terrain vehicle
BA	Biological Assessment
BLM	Bureau of Land Management
BMP	best management practices
BO	Biological Opinion
BOR	Bureau of Reclamation
BP	Before Present
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAL FIRE	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plan Council
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CDCA	California Desert Conservation Area
CDD	California Desert District
CDFG	California Department of Fish and Game

Acronyms

CDPA	California Desert Protection Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Recovery, Compensation, and Liability Act
CFGF	California Fish and Game Commission
CFR	Code of Federal Regulations
cfs	cubic foot per second
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO ₂	carbon dioxide
CRM	cultural resource management
CSP	concentrating solar power
CWA	Clean Water Act
dBA	decibel, A-weighted scale
DC	direct current
DEIS	Draft Environmental Impact Statement
DHS	Department of Health Services
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DPR	Department of Pesticide Regulation
DRAMP	Draft Recreation Area Management Plan
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources

ECFO	El Centro Field Office
EIA	Economic Impact Area
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ERMA	Extensive Recreation Management Area
ERNS	Emergency Response Notification System
ESA	Endangered Species Act
F	Fahrenheit
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FINDS	Facility Index System
FLEFLA	Federal Lands Exchange Facilitation Act
FLPMA	Federal Lands and Policy Management Act
FLREA	Federal Lands Recreation Enhancement Act
FLTFA	Federal Lands Transportation and Facilitation Act
FPEIS	Final Programmatic Environmental Impact Statement
FT	federally listed threatened
GHG	greenhouse gas
GIS	geographic information system
GWSI	Groundwater Site Inventory
I-8	Interstate 8
ICAPCD	Imperial County Air Pollution Control District
IMPLAN	Impact Analysis for Planning

Acronyms

IPCC	Intergovernmental Panel on Climate Change
IPM	integrated pest management
ISD	Imperial Sand Dunes
KGRA	Known Geothermal Resource Area
KOP	Key Observation Point
kV	kilovolt
MCL	maximum contaminant level
MDA	Market Demand Area
MLA	Mineral Leasing Act
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MUC	Multiple Use Classes
mW	megawatt
NAAQS	National Ambient Air Quality Standards
NECO	Northern and Eastern Colorado Desert Coordinated Management Plan
NEMO	Northern and Eastern Mojave Management Plan
NEPA	National Environmental Policy Act
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NGO	nongovernmental organization
NHPA	National Historic Preservation Act
NO ₂	nitrogen dioxide
NOI	Notice of Intent
NO _x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System

NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NSO	no surface occupancy
OHV	off-highway vehicle
PEIS	Programmatic Environmental Impact Statement
PFYC	probably fossil yield classification
PM	particulate matter
PMV	Peirson's milk-vetch
POD	Plan of Development
PV	photovoltaic
R&PP	Recreation and Public Purposes Act
RAMP	Recreation Area Management Plan
RCRA	Resource Conservation Recovery Act
RFD	reasonable foreseeable development
RMZ	Recreation Management Zone
ROD	Record of Decision
ROG	reactive organic gasses
RONA	record of non-applicability
ROW	right-of-way
RS	Revised Statute
RV	recreational vehicle
RWQCB	Regional Water Quality Control Boards
RWQCB7	Regional Water Quality Control Boards District 7

Acronyms

SE	state-listed endangered
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO ₂	sulfur dioxide
SQRU	Scenic Quality Rating Unit
SR	state-listed rare
SR-78	State Route 78
SRMA	Special Recreation Management Area
SRP	Special Recreation Permit
SSAB	Salton Sea Air Basin
ST	state-listed threatened
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TOA	Thomas Olsen and Associates, Inc.
US	United States
USC	United States Code
UPRR	Union Pacific Railroad
USACE	US Army Corps of Engineers
USBP	US Border Patrol
USDA	US Department of Agriculture
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
UXO	unexploded ordnance

VRM	Visual Resource Management
WECO	Western Colorado Desert Route of Travel Plan
WEMO	West Mojave Management Plan
WA	wilderness area
WSA	wilderness study area
$\mu\text{g}/\text{m}^3$	microgram per cubic meter

References Cited

Agee, J.K.

1993 *Fire Ecology of Pacific Northwest Forest*. Washington, D.C.: Island Press.

Almstedt, Ruth Farrell

1982 The Kumeyaay and lipai. In APS/SDG&E Interconnection Project Native American Cultural Resources, pp.6-21. Document on file with San Diego Gas & Electric Company, San Diego, California.

Anonymymous

n.d Draft Environmental Assessment Record East Mesa Non-Competitive Leases for Geothermal Exploration/Development. Unpublished report on file with Bureau of Land Management, El Centro, California.

n.d. Grays Well Bridge Construction, California Desert District, El Centro Resource Area, Imperial Sand Dunes Recreation Area.

1978a Cultural Resource Clearance of a Free-Use Permit CA-060-FP3-4. Unpublished report on file with Bureau of Land Management, El Centro, California.

1978b Cultural Resource Clearance on Proposed Material Sale Permit MP8-6. Unpublished report on file with Bureau of Land Management, El Centro, California.

Apple, Rebecca M. James H. Cleland, Carrie Gregory, Tanya Wahoff, and Andrew York

2006 Cultural Resources Overview and Survey Report for the North Baja Expansion Project. Unpublished report on file with Bureau of Land Management, El Centro, California.

American Recreation Coalition

1999 Outdoor Recreation in America 1999: The Family and the Environment, Recreation Roundtable. Washington, D.C. 34 pp. Web site at: <http://www.funoutdoors.com/files/Roper%201999%20The%20Family%20and%20the%20Environment.pdf>.

Arizona Game and Fish Department

2002 *Vireo bellii arizonae*. Unpublished abstract compiled and edited by the Heritage Data Manangement System, Arizona Game and Fish Department, Phoenix, AZ. 4 pp.

2009 Arizona Off-Highway Vehicles. Web site accessed on 29 March 2009 at: http://www.azgfd.gov/outdoor_recreation/off_highway.shtml.

Armstrong, W.P.

1980 Sand Food: A Strange Plant of the Algodones Dunes. *Fremontia*. Volume 7, Number 4. Pp. 3-9.

Avian Power Line Interaction Committee

2006 Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006.

Baksh, Michael

- 1994 Ethnohistoric Insights into the Quen Sabe Intaglios. In Joseph A. Ezzo (ed.) Recent Research Along the Lower Colorado River: Proceedings from a Symposium Presented at the 59th Annual Meeting of the Society for American Archaeology, Anaheim, California, April 1994. Statistical Research Technical Series No. 51, Tucson, Arizona, pp. 15-48.

Barker, James P.

- 1976 Ethnographic Sketch of the Yuha Desert Region. In Background to the Prehistory of the Yuha Desert Region, edited by Philip J. Wilke, pp. 21-42. Ballena Press, Ramona, California.

Barneby, R.C.

- 1964 Atlas of North American Astragalus, Part II. *Memoirs of the New York Botanical Garden*. Volume 13.

Bates, James

- 1970 The Plank Road. *The Journal of San Diego History*. Volume XVII, Number 2, pp. 24-33.

Bean, Lowell John and Harry W. Lawton

- 1973 Some Explanations for the rise of Cultural Complexity in Native California with Comments on Proto-Agriculture and Agriculture. In *Native Californians: A Theoretical Perspective*, edited by Lowell J. Bean and Thomas C. Blackburn, pp. 19-48. Ballena Press, Socorro, New Mexico.

Bee, Robert

- 1982 The Quechan. In Clyde M. Woods, ed., The APS/SDG&E Interconnection Project, Miguel to the Colorado River and Miguel to Mission Tap: Identification and Evaluation of Native American Cultural Resources. Document on file with San Diego Gas & Electric Company, pp. 34-55.
- 1983 Quechan. In *Southwest*, edited by Alphonso Ortiz, pp. 86-98. Handbook of North American Indians, vol. 10, William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Berry, K.H.

- 1986 Desert Tortoise (*Gopherus agassizii*) Research in California. *Herpetologica*. Volume 42. Pp. 62-67.

Bischoff, Matt C.

- 2008 The Desert Training Center/California-Arizona Maneuver Area, 1942-1944, Vol. 2: Historical and Archaeological Contexts for the Arizona Desert. Technical Series 75, Statistical Research, Inc., Tucson, Arizona.

Boarman, William I.

- 2002 Threats to Desert Tortoise Populations: A Critical Review of the Literature. Prepared for the West Mojave Planning Team, Bureau of Land Management. U.S. Department of Interior, U.S. Geological Survey, Western Ecological Research Center. 91 pp.

Boarman, W.I., M. Sazaki, and W.B. Jennings

- 1997 The Effects of Roads, Barrier Fences, and Culverts on Desert Tortoise Populations in California, USA. *Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles – An International Conference*. 1997:54-58.

Bolton, Herbert E.

- 1931 The San Francisco Colony: Dairies of Anza, Font, and Eixarch, and Narratives by Palóu and Moraga. *Anza's California Expeditions*, v.5. University of California Press.
- 1932 *The Padre on Horseback: A Sketch of Eusebio Francisco Kino, S. J. Apostle to the Pimas*. Loyola University Press, Chicago, 1986.

Bowers, J.E.

- 1996 Seedling Emergence on Sonoran Desert Dunes. *Journal of Arid Environment*. Volume 33. 1996. Pp. 63-72.

Brattstrom, B. H. and M. C. Bondello

- 1983 Effects of Off-road Vehicle Noise on Desert Vertebrates. Pages 167-206 in R. H. Webb and H. G. Wilshore, eds. *Environmental Effects of Off-road Vehicles, Impacts and Management in Arid Regions*. Springer-Verlag, New York.

Brenzikofer, Amber

- 2007 Biological and Cultural Evaluation: Union Pacific Railroad Segment 2A - Niland to Araz Yuma Subdivision Capacity Expansion Project, Imperial County, California Unpublished report on file with Bureau of Land Management, El Centro, California.

Brown, D.E.

- 1994 *Biotic Communities: Southwestern United States and Northwestern Mexico*. University of Utah Press, Salt Lake City, Utah.

Brown, J.K.

- 2000 Introduction and Fire Regimes. Chapter 1; pp1-7. In *Wildland Fire in Ecosystems: Effects of Fire on Flora*, eds. J.K. Brown and J.K. Smith. Gen. Tech. Rep. RMRS-GTR-42-vol.2. Ogden, UT: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Brunasso, Vincent J.

- 2009a Duners Hike Too. In Editorials and other Enlightening Thoughts, Glamis Online. Electronic Document accessed March 2, 2009. http://www.glamisonline.org/Wilderness_Area/Woodlands.asp.
- 2009b The Party's Over! It used to be Palm Springs, and then it was Copper Canyon, then San Philippe, and finally Comp Hill. Now it's time to move on. In Editorials and other Enlightening Thoughts, Glamis Online. Electronic Document accessed March 2, 2009. <http://www.glamisonline.org/Editorials.asp>.

Bull, Charles S

- 1981 A Summarization of an Archaeological Sample of the Glamis/Dunes Area, Imperial Valley, California. Unpublished report on file with Bureau of Land Management, El Centro, California.

CalFlora

- 2009 *Opuntia munzii*. Taxon Report 5941. Web site accessed on March 26, 2009 at: http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=5941.

California Air Resources Board (CARB)

- 2005 Air Resources Board Fact Sheet: Air Pollution Sources, Effects and Control. Web site accessed on 20 November 2008 at: <http://www.arb.ca.gov/research/health/fs/fs2/fs2.htm>.
- 2008 Ambient Air Quality Standards. California Air Resources Board. November 17, 2008. Accessed from the CARB Web site on 6 December 2008 at: <http://www.arb.ca.gov/research/aaqs/aaqs2.pdf>.

California Department of Fish and Game (CDFG)

- 2001 California Wildlife Habitat Relationships System. <http://www.dfg.ca.gov/whdab/whdabold/cwhr/R005.html>.
- 2009 California Endangered Species Act. Accessed October 7, 2009 at <http://www.dfg.ca.gov/habcon/cesa/>

California Department of Water Resources (DWR)

- 2004 California's Groundwater Bulletin 118. Hydrologic Region Colorado River, Imperial Valley Groundwater Basin. Web site accessed on 12 December 2008: <<http://dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs-desc/7-30.pdf>>.
- 2005 California Water Plan: Updated 2005. Department of Water Resources Bulletin 160-05. December 2005. Web site accessed on 23 December 2008 at: <http://www.waterplan.water.ca.gov/previous/cwpu2005/index.cfm>

California Native Diversity Database (CNDDDB)

- 2001 Database Analysis of Special Status Plants, Animals and Natural Communities for the Imperial Sand Dunes. October.
- 2009a California Native Diversity Database. Accessed on October 7, 2009 at http://www.dfg.ca.gov/biogeodata/cnddb/cnddb_info.asp
- 2009b State and Federally Listed Endangered, Threatened, and Rare Plants of California. State of California Department of Fish and Game. April. 16 pp.

California Native Plant Society (CNPS)

- 2009 The CNPS Ranking System. Accessed on October 7, 2009 at <http://www.cnps.org/cnps/rareplants/ranking.php>

California Office of Historic Preservation

- 1995 Instructions for Recording Historical Resources. Department of Parks and Recreation, Sacramento, California.

California Regional Water Quality Control Board (RWQCB)

- 2006 Water Quality Control Plan: Colorado River Basin–Region 7. Web site accessed on 16 December 2008 at: http://www.waterboards.ca.gov/coloradoriver/water_issues/programs/basin_planning/.

California Reptiles and Amphibians

- 2009 *Rana yavapaiensis*—Lowland leopard frog species account. Web site accessed on March 26, 2009 at: <http://www.californiaherps.com/frogs/pages/r.yavapaiensis.html>.

California, State of

- 2006 Our Changing Climate: Assessing the Risks to California. California Energy Commission, California Climate Change Center. CEC-500-2006-077. July. 16 pp.
- 2009 Natural Diversity Database: State and Federally Listed Endangered, Threatened, and Rare Plants of California. Department of Fish and Game, Resource Management and Planning Division. 16 pp., January.

California State Parks

- 2002 Taking the High Road: The Future of California's Off-Highway Vehicle Recreation Program: The Off-Highway Motor Vehicle Recreation Division, Sacramento, California, 98 pp.

Castetter, Edward F., and Willis H. Bell

- 1951 Yuman Indian Agriculture: Primitive Subsistence on the Lower Colorado and

Cheever, Dayle and Judy Berryman

- 2008 Cultural Resource Inventory for Proposed Construction, Operation, and Maintenance of Tactical Infrastructure for Customs and Border Protection, El Centro Sector, California. Unpublished report on file with Bureau of Land Management, El Centro, California.

CIC Research

- 2009 ISDRA Recreation Baseline Parameters for Existing Conditions. March 26, 2009.

Cleland, James H. and Rebecca McCorkle Apple

- 2006 Historic Properties Treatment Plan for the North Baja Gas Pipeline Expansion Project. Unpublished report on file with Bureau of Land Management, El Centro, California.

Cleland, James H., Rebecca McCorkle Apple, Mitch Bornyasz, Richard Deis, Christy Dolan, Carrie Gregory, Ken Hedges, John Hildebrand, Boma Johnson, Brian Ludwig, Jackson Underwood, and Tanya Wahoff

- 2003 A View Across the Cultural Landscape of the Lower Colorado Desert: Cultural Resource Investigations for the North Baja Pipeline Project. Unpublished report in file with EDAW, San Diego.

Cline, Lora L.

- 1984 Just Before Sunset. J and L Enterprises, Jacumba, California.

Coachella Valley Multi-Species Habitat Conservation Plan

- 2009 Species Information – Orocopia Sage. Web site accessed on March 26, 2009 at: http://www.cvmshcp.org/sp_52.htm.

Collins, G. Edward and Jay C. von Werlhof

- 1996 Cultural Resource Survey and Assessment of the Westside Main Flood Control Area. Unpublished report on file with Bureau of Land Management, El Centro, California.

Collins, Kimberly

- 2006 A Profile of the 2006 Visitor to the Imperial San Dunes Recreational Area.

Cuero, Delfina

- 1970 The Autobiography of Delfina Cuero: A Diegueno Woman. As told to Florence C. Shippek. Malki Museum Press, Morongo Indian Reservation.

Davis, James T.

- 1961 Trade Routes and Economic Exchange among the Indians of California. University of California Archaeological Survey Report No.54, Berkeley.

Desert Tortoise Compensation Team

- 1991 Compensation for the Desert Tortoise. A report prepared for the Desert Tortoise Management Oversight Group. Approved by the Desert Tortoise Management Oversight Group. 21 pp.

Dominici, Debra

- 1981 Archaeological Survey Report for the Proposed Sand Hills Interchange Project. Unpublished report on file with Bureau of Land Management, El Centro, California.
- 1982 Archaeological Phase I Survey Report for the Proposed Ogilby Material Site. Unpublished report on file with Bureau of Land Management, El Centro, California.

EDAW/AECOM

- 2009 Final Baseline Raven Monitoring Report. Prepared for Sanitation Districts of Los Angeles County. 138 pp.

Elliott, Wallace W.

- 1883 *History of San Bernardino and San Diego Counties*. 1965 Reproduction by Riverside Museum Press, Riverside, California.

Environmental Protection Agency (EPA)

- 2006 Final NONROAD 2005 Model. Latest revision June 2006.
- 2008 Climate Change—Science: State of Knowledge. Web site accessed on 2 December 2008 at: <http://www.epa.gov/climatechange/science/stateofknowledge.html>.

Federal Energy Regulatory Commission (FERC) and California State Lands Commission

- 2007 North Baja Pipeline Project. Final Environmental Impact Statement/Environmental Impact Report and Land Use Plan Amendment. Web site accessed on March 27, 2009 at: <http://www.ferc.gov/industries/gas/enviro/eis/2007/06-08-07.asp>.

Felger, R.S.

- 2000 Flora of the Gran Desierto and Rio Colorado of northwestern Mexico. University of Arizona Press, Tucson, Arizona.

- Flat-tailed Horned Lizard Interagency Coordinating Committee
2003 Flat-tailed Horned Lizard Rangewide Management Strategy, 2003 Revision: An Arizona-California Conservation Strategy. 121 pp.
- Forbes, Jack D.
1965 Warriors of the Colorado: The Yumas of the Quechan Nation and their Neighbors. University of Oklahoma Press, Norman, Oklahoma.
- Forde, Daryll C.
1931 Ethnography of the Yuma Indians. American Archaeology and Ethnology 28(4): 83-278. University of California Publications, Berkeley, California.
- Fredrickson, David L.
1973 *Early Cultures of the North Coast Ranges, California*. Ph.D. dissertation, Department of Anthropology, University of California, Davis.
- Funk, R.S.
1981 *Phrynosoma mcallii*. Catalog of American Amphibians and Reptiles. Volume 281. Pp. 1-2.
- Geist, V.A.
1978 Behavior. Pages 283-296 in J.L. Schmidt and D.L. Gilbert, eds. *Big Game of North America: Ecology and Management*. Stackpole Books, Harrisburg, PA.
- Gifford, E.W.
1918 Clans and Moieties of Southern California. University of California Publications in American Archaeology and Ethnology.
1931 The Kamia of Imperial Valley. Bureau of American Ethnology, Bulletin 97. Smithsonian Institution, Washington, D.C.
1933 The Cocopa. University of California Publications in American Archaeology and Ethnology, 31 (5):257-334. University of California Press, Berkeley, California.
- Haas, Glen. E. and Kimberly Collins
2008 A Profile of the 2006 Visitor to the Imperial Sand Dunes Recreation Area. Prepared for United Desert Gateway and BLM. May 2008.
- Hale, Michah
2005 Cultural Resources Inventory for the South Dunes Operations Center. July.
- Hangan, Margaret
2000 Grays Well Bridge Road and Border Patrol Traffic Barriers. Unpublished report on file with Bureau of Land Management, El Centro, California.
- Hann, W.J. and D.C. Bunnell
2001 Fire and Land Management Planning and Implementation Across Multiple Scales. *International Journal of Wildland Fire* 10:389-403.
- Hardy, A.R. and F.G. Andrews
1979 *An Inventory of Selected Coleoptera from the Imperial Dunes*. Unpublished report prepared for the Bureau of Land Management. Contract No. CA-060-1285-1225-DE00.

- Harper, J.L., P.H. Lovell, and K.G. Moore
1970 The Shapes and Sizes of Seeds. *Annual Review of Ecology and Systematics*. Volume 1. Pp. 327-346.
- Harris, L.D.
1991 The Need, Rationale and Implementation of Wildlife Dispersal Corridors. ISSUE IV in a Series of Papers for the SWIM Model Ordinance Project (SWFWMD). 169 pp.
- Haury, Emil V.
1975 *The Stratigraphy and Archaeology of Ventana Cave*. University of Arizona Press, Tucson, Arizona.
- Hayden, Julian D.
1976 Pre-altithermal Archaeology in the Sierra Pinacate, Sonora, Mexico. *American Antiquity* 41(3):274-289. Salt Lake City, Utah.
- Heizer, Robert F. and Thomas R. Hester
1978 *Great Basin Projectile Points: Forms and Chronology*. Ballena Press, Socorro, New Mexico.
- Hester, J.J.
1972 Blackwater Locality Number 1: A Stratified Early Man Site in Eastern New Mexico. Fort Burgwin Research Center, Rancho de Taos, New Mexico.
- Hester, Patricia
2009 E-mail message from BLM Regional Paleontologist to Erin Dreyfuss, ECFO Natural Resources Specialist. March 19.
- Imperial County
n.d. Reclamation Plan, Imperial County Public Works.
2007 Imperial County Flood Management Plan. Imperial County Office of Emergency Services. February 2007. 102 pp.
2008a Imperial County Air Quality Management Plan. Imperial County Air Quality Control District. Chapters 1 and 2.
2008b Imperial County State Implementation Plan 2008: Air Quality. Imperial County, Chapter 1, 19 pp.
- Imperial County Air Pollution Control District (ICAPCD)
2007 Rules and Regulations: Revised. Web site accessed on 21 November 2008 at: <http://www.co.imperial.ca.us/AirPollution/Forms%20&%20Documents/APCD%20Rules%20November%202006,%202007.pdf>.
2008 Air Quality Monitoring. Web site accessed on 20 November 2008 at: <http://www.co.imperial.ca.us/AirPollution/Default.htm>.
- Imperial Irrigation District
2006 All-American Canal. Web site accessed on 21 November 2008: <<http://www.iid.com/Water/AllAmericanCanal>>.
- Intergovernmental Panel on Climate Change (IPCC)
2001 Climate Change 2001: Synthesis Report (Summary for Policymakers). Cambridge University Press. Cambridge, England and New York, New York.

- Web site accessed on 2 December 2008 at: <http://www.ipcc.ch/pdf/climate-changes-2001/synthesis-spm/synthesis-spm-en.pdf>.
- 2007 Climate Change 2007: Synthesis Report (Summary for Policymakers). Cambridge University Press. Cambridge, England and New York, New York. Web site accessed on 2 December 2008 at: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.
- Jennings, Jesse D.
- 1978 Origins. In J.D. Jennings, ed., *Ancient Native Americans*. Freeman, San Francisco, California. pp.1-41.
- Johnson, Barnhart
- 1976 Glamis Gravel Free-Use Permit. Unpublished report on file with Bureau of Land Management, El Centro, California.
- Kelly, William H.
- 1977 *Cocopa Ethnography*. University of Arizona Press, Tucson, Arizona.
- Kimsey, Lynn S.
- 2009 Interim Report on the Insect Diversity of the Algodones Dunes. University of California, Department of Entomology. August 27, 2009. 30 pp.
- Kroeber, A.L.
- 1920 Yuman Tribes of the Lower Colorado. *American Archaeology and Ethnology* 16(8):475-485. University of California Publications, Berkeley, California.
- 1925 *Handbook of the Indians of California*. Dover Publications, New York, New York.
- Langdon, Margaret
- 1970 A Grammar of Diegueño: The Mesa Grande Dialect. *University of California Publications in Linguistics* 66, Berkeley, California.
- 1975 Kamia and Kumeyaay: A Linguistic Perspective. *Journal of California Anthropology* 2(1):64-70.
- Lawton, Harry W.
- 1976 History and Ethnohistory of the Yuha Desert (1769-1865). In Philip J. Wilke, ed. *Background to Prehistory of the Yuha Desert. Ballena Press Anthropological Papers* 5:43-72.
- Lawton, Harry W. and Lowell J. Bean
- 1968 A Preliminary Reconstruction of Aboriginal Agricultural Technology Among the Cahuilla. *The Indian Historian* 1(5): 18-24,29.
- Leitner, Arnold
- 2003 *Fuel from the Sky: Solar Power's Potential for Western Energy Supply*. RDI Consulting, National Renewable Energy Laboratory. NREL/SR-550-32160.
- Lovich, J.E. and D. Brainbridge
- 1999 Anthropogenic Degradation of the Southern California Desert Ecosystem and Prospects for Natural Recovery and Restoration. 18 pp.
- Luckenbach, R. A.
- 1982 *Ecology and Management of the Desert Tortoise (Gopherus agassizii) in California*. Pages 1-37 In R.B. Bury, ed., *North American Tortoise and*

- Conservation Ecology. U.S. Department of Interior, USFWS, Wildlife Research Report 12.
- Luomala, Katharine
- 1978 Tipai-Ipai. In California, edited by Robert F. Heizer, pp.592-609. Handbook of North American Indians, vol. 8, W.C. Sturtevant, ed. Smithsonian Institution, Washington, D.C.
- Maxon, James C.
- 1981 Cultural Resource Inventory of the Proposed Wildlife Windmill/Watering Sites along the Coachella Canal, Imperial Valley, CA. Unpublished report on file with Bureau of Land Management, El Centro, California.
- McDonald, Alison Meg
- 1992 Indian Hill Rockshelter and Aboriginal Cultural Adaptation in Anza-Borrego Desert State Park, Southeastern California. Ph.D. dissertation, Department of Anthropology, University of California at Riverside.
- McGuire, Randall H.
- 1982 Environmental Background. In Randall H. McGuire and Michael B. Schiffer, eds *Hohokam and Patayan: Prehistory of Southwestern Arizona*. Academic Press, New York, New York. pp. 13-56.
- McGuire, Randall H. and Michael B. Schiffer, eds.
- 1982 Hohokam and Patayan: Prehistory of Southwestern Arizona. Academic Press, New York, New York.
- McKinney, Charles M.
- 1973 Glamis KGRA. Unpublished report on file with Bureau of Land Management, El Centro, California.
- Meller, Sidney L.
- 1946 The Army Ground Forces: The Desert Training Center and CAMA, Study No. 15.
- Moratto, Michael J.
- 1984 *California Archaeology*. Academic Press, San Diego, California.
- Morgan, P., C.C. Hardy, T.W. Swetnam, M.G. Rollins, D.G. Long
- 2001 Mapping Fire Regimes across Time and Space: Understanding Coarse and Fine-scale Fire Patterns. *International Journal of Wildland Fire* 10:329-342.
- Munger Oil Information Service
- 1992 *Munger Map Book*, 36th Ed., 9800 S. Sepulveda Blvd., Ste. 723, Los Angeles, California, 90045.
- Muth, A., and M. Fisher
- 1992 Development of Baseline Data and Procedures for Monitoring Populations of the Flat-tailed Horned Lizard, *Phrynosoma mcallii*. Contract Report No. FG9268, to California Department of Fish and Game, Sacramento, California.
- Nadeau, Remi
- 1997 *The Water Seekers*. Crest Publications, Santa Barbara, California.

National Interagency Fire Center

- 2009 *Environmental Guidelines for Delivery of Retardant or Foam near Waterways: Interagency Standards for Fire and Aviation Operations.*

Nicolai, Nancy

- 1996 Environmental Assessment FONSI for the Watchable Wildlife Site-Algodones Dunes. Unpublished report on file with Bureau of Land Management, El Centro, California.

Norris, Robert M.

- 1995 Sand Dunes of the California Desert. *The California Desert.*

Office of Indian Energy and Economic Development

- 2009a Tribal Energy and Environmental Information Clearinghouse: Geothermal Energy Systems Descriptions. Web site accessed on 23 October 2009 at: <http://teeic.anl.gov/er/geothermal/restech/desc/index.cfm>.
- 2009b Tribal Energy and Environmental Information Clearinghouse: Solar Energy Systems Descriptions. Web site accessed 23 October 2009 at: <http://teeic.anl.gov/er/wind/restech/desc/index.cfm>.
- 2009c Tribal Energy and Environmental Information Clearinghouse: Wind Energy Facilities Descriptions. Web site accessed 23 October 2009 at: <http://teeic.anl.gov/er/wind/restech/desc/index.cfm>.

Parker, S.C.

- 1985 Predictive Modeling of Site Settlement Systems using Multivariate Logistics. In *For Concordance in Archaeological Analysis*, edited by C. Carr, pp. 173-207. Westport Publishers, St. Louis, Missouri.

Parker, P.L., and King, T.F.

- 1998 Guidelines for Evaluating and Documenting Traditional Cultural Properties. National Register Bulletin 38. US Department of Interior, National Park Service, Washington, D.C.

Pendleton, Lorann, et al.

- 1986 Archaeological Investigations in the Picacho Basin: Southwest Powerlink Project - San Hills to the Colorado River Segment. Unpublished report on file with Bureau of Land Management, El Centro, California.

PHR Associates and Ricard Carrico

- 1989 The Plank Road of Imperial County. Unpublished report on file with Bureau of Land Management, El Centro, California.

Pigniolo, Andrew R., Jackson Underwood, and James H. Cleland

- 1997 Where Trails Cross: Cultural Resources Inventory and Evaluation for the Imperial Project, Imperial County, California. Document on file with the Southeastern Information Center, California Historical Resources Information System, Ocotillo and EDAW, Inc., San Diego.

Pitts, James P., Joseph S. Wilson, Kevin A. Williams, and Nicole F. Boehme

- 2009 Velvet Ants (*Hymenoptera: Mutillidae*) of the Algodones Sand Dunes of California, USA. *Zootaxa* 2131: 1-53, Magnolia Press.

Porter, J.M., O. Mistretta, and S. Hobbs

- 2005 Studies of the Natural History of *Astragalus Magadalenae* var. *Peirsonii* (Peirson's Milk-vetch). Rancho Santa Ana Botanic Garden. 75 pp.

Pourade, Richard F.

- 1960 *The History of San Diego: The Explorers*. Union-Tribune Publishing Company, San Diego, California.
- 1961 *Time of the Bells*. The History of San Diego. Union-Tribune Publishing, San Diego, California.
- 1963 *The Silver Dons*. The History of San Diego. Union-Tribune Publishing, San Diego, California.
- 1964 *The Glory Years*. The History of San Diego. Union-Tribune Publishing, San Diego, California.

Queen, Rolla L.

- 1999 BLM Off Road Vehicle Bridge Off-Highway Vehicle Grant OR-1CD-172 Grays Well Bridge 96: Evaluation of Significance and Effects All-American Canal. Unpublished report on file with Bureau of Land Management, El Centro, California.

Rado, T.

- 1995 Biological Survey Report, Chemgold Imperial Project, California. May 1995.

Riddell, Francis A., and W.H. Olsen

- 1969 An Early Man Site in the San Joaquin Valley. *American Antiquity* 34(2):121-130.

Rimpo and Associates

- 2008 URBEMIS 2007 for Windows, Version 9.2.4 Emissions Estimation for Land Use Development Projects. Released February 2008.

Riparian Habitat Joint Venture and California Partners in Flight

- 2004 The Riparian Bird Conservation Plan: a Strategy for Reversing the Decline of Riparian Associated Birds in California. Version 2.0.

Rogers, Malcolm J.

- 1939 Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas. *San Diego Museum of Man Papers* 3.
- 1945 An Outline of Yuman Prehistory. *Southwestern Journal of Anthropology* 1(2):167-198. Albuquerque, New Mexico.

Rogers, T.H.

- 1992 Geologic Map of California, Santa Ana Sheet. California Division of Mines and Geology. 1:250,000 Map.

Romspert, A.P. and J.H. Burk

- 1979 *Algodones Dunes Sensitive Plant Project 1978-1979*. Unpublished Report Prepared for the Bureau of Land Management. Project Number 1510 (C-961.1).

Rosenberg, Seth and Brian F. Smith

- 2008 A Class III-Intensive Field Survey for the Yuma Sector Project. Unpublished report on file with Bureau of Land Management, El Centro, California.

- Rostral, D.C., V.A. Lance, J.S. Grimbles, and A.C. Alberts
 1994 Seasonal Reproductive Cycle of the Desert Tortoise (*Gopherus agassizii*) in the Eastern Mojave Desert. *Herpetological Monographs*, Volume 8. Pp. 72-102.
- Russell, John C., Clyde M. Woods, Jackson Underwood, James H. Cleland, Carrie Gregory, and Michael Wilken
 2002 An Assessment of the Imperial Sand Dunes as a Native American Cultural Landscape. Unpublished report on file with Bureau of Land Management, El Centro, California.
- Sample, L.L.
 1950 *Trade and Trails in Aboriginal California*. University of California Archaeological Survey Reports 8:1-30, Berkeley, California.
- Sander, Jay K. and Patrick O. Maxon
 2007 Phase I Cultural Resources Reconnaissance for the Union Pacific Railroad, Yuma Subdivision Capacity Project, Riverside and Imperial Counties, California. Unpublished report on file with Bureau of Land Management, El Centro, California.
- San Diego County Water Authority
 2007 Canal Lining Projects Fact Sheet. August 2007. 2 pp.
- San Diego Gas and Electric
 2007 Estimated average cost per mile for maintenance of overhead high-voltage transmission corridors, January 9, 2007.
- Schaefer, Jerry
 1994 The Challenge of Archaeological Research in the Colorado Desert: Recent Approaches and Discoveries. *Journal of California and Great Basin Anthropology* 16(1):60-80.
- Schaefer, Jerry and Sherri Andrews
 2005 Class II and III Cultural Resources Inventory and Evaluation for the All-American Canal Lining Project, Imperial County, CA. Unpublished report on file with Bureau of Land Management, El Centro, California.
- Schaefer, Jerry and Mark Giambastiani
 2004 A Class I Cultural Resources Inventory for the All-American Canal Lining Project. Unpublished report on file with Bureau of Land Management, El Centro, California.
- Schaefer, Jerry and Sinead Ni Ghabhlain
 2003 A History and Evaluation of the Coachella Canal, Riverside and Imperial Counties, CA. Unpublished report on file with Bureau of Land Management, El Centro, California.
- Schaefer, Jerry, D. Palette, C. O'Neill, and J. Eighmey
 1998 A Cultural Resources Inventory and Evaluation of the Imperial Irrigation District's C-Line Pole Replacement Project, Imperial County, California. Unpublished report on file with Bureau of Land Management, El Centro, California.

Schaefer, Jerry and Collin O'Neill

1998 A History and Evaluation of the Old Coachella Canal, Imperial County, California. Unpublished report on file with Bureau of Land Management, El Centro, California.

2001 The All-American Canal: An Historic Properties Inventory and Evaluation. Unpublished report on file with Bureau of Land Management, El Centro, California.

Scharf, Laura and Jim Scharf

1999 Sound Testing: Decibel Levels for Stock & Modified Mufflers. *Dirt Wheels*. December 1999.

Schoenherr, Allan A.

1992 *A Natural History of California*. University of California Press, Berkeley and Los Angeles.

Schroeder, A.L.

1975 The Hohokam, Sinagua, and the Hakataya. Occasional Paper 3. An Imperial Valley College Museum Society Publication, El Centro, California.

1979 Prehistory: Hakataya. In *Southwest*, pp. 100-107, edited by Alfonso Ortiz. Handbook of North American Indians, Volume 9, William G. Sturtevant, ed. Smithsonian Institution, Washington, D.C.

Sheppard, J.M.

1996 Le Conte's Thrasher. In the Birds of North America, No. 230. A. Poole and F. Gill, eds. The Academy of Natural Sciences, Philadelphia; and The American Ornithologists' Union, Washington, D.C.

Shipek, Florence C.

1988 Pushed into the Rocks. University of Nebraska Press, Lincoln, Nebraska.

Smith, David M., Jay Sander, Pam Daly, and Patrick O. Maxon.

2008 Phase II Test and Evaluation for Cultural Resources, Union Pacific Railroad, Yuma Subdivision Capacity Project, Riverside and Imperial Counties, California. Unpublished report on file with Bureau of Land Management, El Centro, California.

South Coast Air Quality Management District

1993 California Environmental Quality Act Air Quality Handbook.

Spier, Leslie

1923 Southern Diegueno Customs. University of California Publications in American Archaeology and Ethnology, 20:297-358.

Stebbins, R.C., ed.

1985 Western Reptiles and Amphibians. 2nd edition, Houghton Mifflin Co., Boston, Massachusetts.

Steiger, J.W. and R.H. Webb

2000 Recovery of Perennial Vegetation in Military Target Sites in the Eastern Mojave Desert, Arizona. US Geological Survey Open-File Report 00-355. Denver, Colorado.

Sykes, Godfrey

- 1937 The Colorado Delta. American Geographical Society Special Publications No.19. New York, New York.

Thomas, Greg

- 2002 Results of a Pedestrian Survey, Osborne Overlook, Imperial County, California. Unpublished report on file with Bureau of Land Management, El Centro, California.

Thomas Olsen and Associates, Inc. (TOA)

- 2001 *Biology, Distribution, and Abundance of Peirson's Milk-vetch and Other Special Status Plants of the Imperial Dunes, California. Final Report.* Prepared for the American Sand Association. July 2, 2001.

Tibor, D.P., ed.

- 2001 California Native Plant Society's Inventory of Rare and Endangered Plants of California. California Native Plant Society, Sacramento, California.

Trippel, Eugene H.

- 1889 The Yuma Indians. *Overland Monthly* 13(78):561-584 and 14(79):3-1 1.

Turner, F.B., J.C. Rorabaugh, E.C. Nelson, and M.C. Jorgensen

- 1980 A Survey of the Occurrence and Abundance of the Flat-tailed Horned Lizard (*phrynosoma mcallii*) in California. Laboratory of Nuclear Medicine and Radiation Biology, University of California , Riverside, California.

Underwood, Jackson and James H. Cleland

- 2002 Class II Archaeological Survey of the Imperial Dunes. Unpublished report on file with Bureau of Land Management, El Centro, California.

US Department of Agriculture, Natural Resources Conservation Service (USDA NRCS)

- 1981 Soil Survey of Imperial County, California: Imperial Valley Area. US Department of Agriculture Soil Conservation Service in cooperation with the University of California Agricultural Experiment Station and Imperial Irrigation District. October 1981. 123 pp. + maps.
- 2008 Natural Resource Conservation Service Web Soil Survey. Web site accessed on 12 December 2008 at: <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>.

US Department of Interior (DOI)

- 2007 Department Manual 517 DM 1: Pesticides: Integrated Pest Management Policy. May 2007. 5 pp.

US Department of Interior, Bureau of Land Management (BLM)

- 1980 The California Desert Conservation Area Plan. As amended. United States Department of the Interior; Bureau of Land Management; Desert District, Riverside, California.
- 1981 Wilderness Management Policy. 30pp. plus appendicies.
- 1984a BLM Manual 8400–Visual Resource Management.
- 1984b BLM Manual H-8410-1–Visual Resource Inventory.

- 1987 Recreation Area Management Plan and Environmental Assessment for the Imperial Sand Dunes. Publication Index Number BLM-CA-PL-87-001-8320. El Centro Resource Area, California. July 1987.
- 1990 Use of Biological Control Agents on Public Lands.
- 1993 *Imperial Sand Dunes Visitor Research Case Study*. August.
- 1994 South Coast Resource Management Plan and Record of Decision. California Desert District, Palm Springs-South Coast Resource Area. 161 pp. June 1994.
- 2000 Rare Plants 2000 Strategy.
- 2001a *National Management Strategy for Motorized OHV Use on Public Lands*.
- 2001b Monitoring of Special Status Plants in the Imperial Dunes, Imperial County, California, 1977-2000. Prepared by Bureau of Land Management, California State office, Sacramento.
- 2001c West Mesa ACEC—Area of Critical Environmental Concern. Biological Evaluation Report. Prepared by Gavin Wright, El Centro Field Office.
- 2001d Field trip notes during an Imperial Sand Dunes Recreation Area site visit. October 18, 2001.
- 2002a Northern and Eastern Colorado Desert Coordinated Management Plan. Amendment to the California Desert Conservation Area Plan. Record of Decision. 12 pp.
- 2002b Northern and Eastern Mojave Desert Management Plan. Amendment to the California Desert Conservation Area Plan. Record of Decision. 15 pp.
- 2002c *National Mountain Bicycle Strategic Action Plan*.
- 2002d Proposed Northern and Eastern Colorado Desert Coordinated Management Plan and Final Environmental Impact Statement. An amendment to the California Desert Conservation Area Plan 1980 and Sikes Act Plan with the California Department of Fish and Game. July 2002.
- 2003a Decision Record for Approved Western Colorado Desert Routes of Travel Designations. An amendment to the California Desert Conservation Area Plan 1980. 21 pp. March 2003.
- 2003b Final Environmental Impact Statement for the Imperial Sand Dunes Recreation Area Management Plan and Proposed Amendment to the California Desert Conservation Area Plan, 1980. El Centro Field Office. May 2003.
- 2004a Monitoring of Special Status Plants in the Algodones Dunes, Imperial County, California, 1977 to 2002. Prepared by Bureau of Land Management, California State office, Sacramento. 61 pp.
- 2004b Monitoring of Special Status Plants in the Algodones Dunes, Imperial County, California, Results of 2003 Pilot Sampling. Prepared by Bureau of Land Management, California State office, Sacramento. 37 pp.
- 2005a H-1601-1 - Land Use Planning Handbook. March 11.
- 2005b Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. June.
- 2005c Record of Decision, Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments. December.

- 2005d 2004 Monitoring of Special Status Plants in the Algodones Dunes, Imperial County, California. Prepared by Bureau of Land Management, California State office, Sacramento. 75 pp.
- 2005e 2005 Monitoring of Peirson's Milk-vetch in the Algodones Dunes, Imperial County, California. Prepared by Bureau of Land Management, California State office, Sacramento. 44 pp.
- 2005f Monitoring of Algodones Dunes sunflower and Psammophytic Vegetation in the Algodones Dunes, Imperial County, California. Prepared by Bureau of Land Management, California State office, Sacramento. 51 pp.
- 2006a Fugitive Dust Control Plan. El Centro Field Office. 14 pp.
- 2006b Federal Reserved Water Rights. Western States Water Laws. Web site accessed on 23 December 2008 at: <http://www.blm.gov/nstc/WaterLaws/fedreservedwater.html>.
- 2006c West Mojave Management Plan. Amendment to the California Desert Conservation Area Plan. Record of Decision. 23 pp.
- 2006d 2006 Monitoring of Peirson's Milk-vetch in the Algodones Dunes, Imperial County, California. Prepared by Bureau of Land Management, California State office, Sacramento. 60 pp.
- 2007a Final Programmatic Environmental Impact Statement; Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States. June.
- 2007b Final Environmental Impact Statement for the Truckhaven Geothermal Leasing Area, Imperial County, California. October.
- 2007c 2007 Monitoring of Peirson's Milk-vetch in the Algodones Dunes, Imperial County, California, Seed Bank Sampling Pilot Study. Prepared by Bureau of Land Management, California State office, Sacramento. 57 pp.
- 2008a H-1790-1 National Environmental Policy Act.
- 2008b Imperial Sand Dunes Recreation Area Management Plan Scoping Report. BLM El Centro Field Office. 13 pp. September 2008.
- 2008c Record of Decision and Resource Management Plan Amendments for Geothermal Leasing in the Western United States. 102 pp. December 2008.
- 2008d Recreation and Visitor Services Strategy. BLM California State Office, California Recreation Program. 40 pp.
- 2008e California Public Lands.
- 2008f Final Programmatic Environmental Impact Statement for Leasing of Geothermal Resources in Eleven Western United States and Alaska, Including Proposed Amendments to Selected Land Use Plans. 1,792 pp. October 2008.
- 2009a Special Status Species abstracts. Website accessed on March 26, 2009 at: <http://www.blm.gov/ca/pa/ssp/>.
- 2009b Visitation Data: Imperial Sand Dunes Special Recreation Management Area, California (2004-2008). El Centro Field Office, El Centro, California.
- 2009c Fact Sheet on the BLM's Management of Livestock Grazing. January. Web site: <http://www.blm.gov/wo/st/en/prog/grazing.html>.

- US Department of Interior, Bureau of Land Management and US Department of Energy,
Energy Efficiency and Renewable Energy
2003 Assessing the Potential for Renewable Energy on Public Lands.
- US Department of Interior, Bureau of Reclamation (BOR)
1994 Final Environmental Impact Statement/Final Environmental Impact Report: All-American Canal Lining Project, Imperial County, California. March.
2008 Boulder Canyon Project: All-American Canal System. Lower Colorado Regional Office, Boulder Canyon Operations Office. Web site accessed on 21 November 2008: <<http://www.usbr.gov/dataweb/html/allamcanal.html>>.
- US Department of Interior, US Fish and Wildlife Service (USFWS)
1990 Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Mojave Population of the Desert Tortoise. *Federal Register* 55(63):12178-12191.
1993 Endangered and Threatened Wildlife and Plants; Proposed Rule to List the Flat-tailed Horned Lizard as Threatened. *Federal Register* 58(227): 62624-62629.
1994a Desert Tortoise (Mojave Population) Recovery Plan. USFWS, Portland, Oregon.
1994b Endangered and Threatened Wildlife and Plants; Determination of Critical Habitat for the Mojave Population of the Desert Tortoise. *Federal Register* 59(26):5820-5866.
1998 Endangered and Threatened Wildlife and Plants; Determination of Endangered or Threatened Status for Five Desert Milk-vetch Taxa From California. *Federal Register* 63(93):53596-53615.
2004 Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Astragalus magdalenae* var. *peirsonii* (Peirson's Milk-vetch); Final Rule. *Federal Register* 69(149):47330-47351.
2006 Endangered and Threatened Wildlife and Plants; Withdrawal of the Proposed Rule to List the Flat-tailed Horned Lizard as Threatened. *Federal Register* 71(124):36745-36752.
2008a Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for *Astragalus magdalenae* var. *peirsonii* (Peirson's Milk-vetch); Final Rule. *Federal Register* 73(31):8748-8785.
2008b Draft revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). USFWS, California and Nevada Region, Sacramento, California. 209 pp.
2009 Request for Information on Endangered and Threatened Species in the Imperial Sand Dunes Recreation Area, Imperial County, California. Memorandum response from the Assistant Field Supervisor, Carlsbad Fish and Wildlife Office, Carlsbad, California, March 19, 2009. 3 pp.
- van Wormer, Steve, Sue Wade, Susan D. Walter, and Susan Arter
2007 An Isolated Frontier Outpost: Historical and Archaeological Investigations of the Carrizo Creek Stage Station. Unpublished report on file with California

- State Parks.
- Velten, R.K. and C.L. Bellamy
- 1987 A new genus and species of *Coroebini* Bedel from Southern California with a discussion of its relationships in the tribe (Coleoptera, Buprestidae). *The Coleopterists Bulletin* 41(1):185-192.
- von Werlhof, Jay
- 1986 Archaeological Survey of the Gordons Well Plantation Powerline. Unpublished report on file with Bureau of Land Management, El Centro, California.
- von Werlhof, Jay and Sherilee von Werlhof
- 1977a Archaeological Examinations of Certain Portions of Chocolate Mountains. Unpublished report on file with Bureau of Land Management, El Centro, California.
- 1977b Archaeological Examinations of Certain Test Drill Hole Sites on Pilot Knob Mesa. Unpublished report on file with Bureau of Land Management, El Centro, California.
- 1977c Archaeological Examinations of Certain Thermal Gradient Drill Holes near Glamis, CA. Unpublished report on file with Bureau of Land Management, El Centro, California.
- 1977d Addendum: Archaeological Examinations of Certain Drill Holes near Glamis, CA. Unpublished report on file with Bureau of Land Management, El Centro, California.
- 1979a Archaeological Examinations of the Occidental Geothermal Incorporated Sites near Glamis, CA. Unpublished report on file with Bureau of Land Management, El Centro, California.
- 1979b Archaeological Examinations of Certain Geologic Sties in Imperial Valley. Unpublished report on file with Bureau of Land Management, El Centro, California.
- Warren, Claude N.
- 1984 The Desert Region. In *California Archaeology*, edited by Michael J. Moratto, pp. 339-430. Academic Press, San Diego, California.
- Warren, Claude N. and Robert H. Crabtree
- 1986 Prehistory of the Southwestern Area. In Warren L. D'Azevedo, ed., *Handbook of North American Indians*, Vol.11, Great Basin. Smithsonian Institution, Washington, D.C., pp.183-193.
- Warren, Elizabeth von Till, Robert H. Crabtree, Claude N. Warren, Martha Knack, and Richard McCarty
- 1981 A Cultural Resources Overview of the Colorado Desert Planning Units. Bureau of Land Management, California Desert District, Riverside, California.
- Waters, Michael R.
- 1982 The Lowland Patayan Ceramic Tradition. In *Hohokam and Patayan: Prehistory of Southwestern Arizona*, edited by Randall H. McGuire and Michael B. Schiffer. Academic Press, New York. Unpublished report on file with Bureau of Land Management, El Centro, California.

Weakly, Ward F.

- 1975 Archaeological Survey and Evaluation Studies for the Coachella Canal, Imperial County, CA—Colorado River Basin Salinity Control Project. Unpublished report on file with Bureau of Land Management, El Centro, California.

Weller, Pat

- 1995 Field Exam of Gordon's Well Bridge Site. Unpublished report on file with Bureau of Land Management, El Centro, California.

Westec Services, Inc.

- 1977 *Survey of Sensitive Plants for the Imperial Dunes*. Prepared for Department of Interior, Bureau of Land Management. August 1977.

Willoughby, J.W.

- 2001 Monitoring of special status plants in the Algodones Dunes, Imperial County, California: 1977, 1998, 1999, and 2000. Bureau of Land Management, Sacramento, CA.

Woodbury, A.M. and R. Hardy

- 1940 The Dens and Behavior of the Desert Tortoise. *Science*. December 6, 1940. Page 529.

Woods, Clyde M.

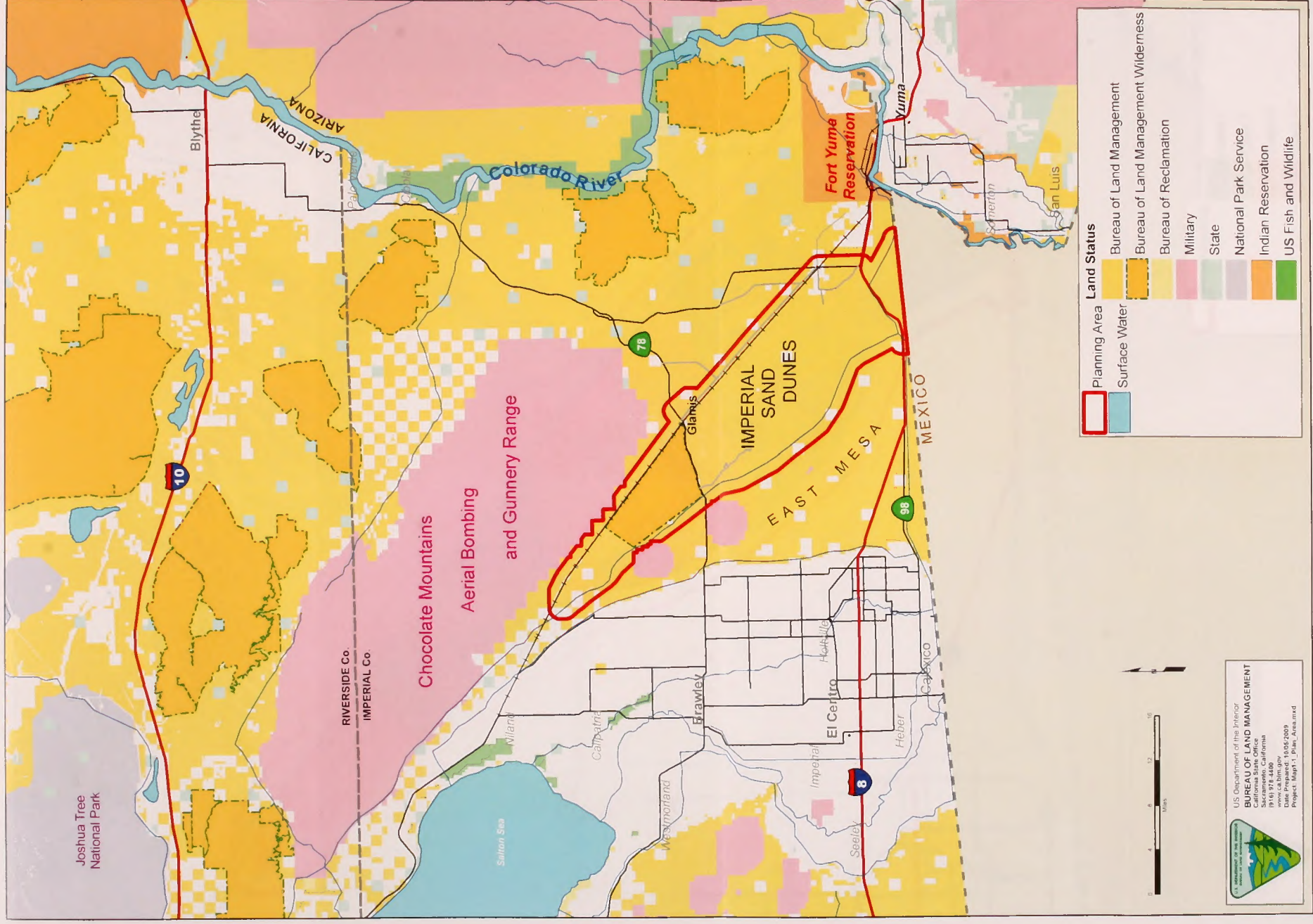
- 1982 Miguel to the Colorado River and Miguel to Mission Tap: Identification and Evaluation of Native American Cultural Resources. APS/SDG&E Interconnection Project. Document on file with San Diego Gas & Electric Company.

Wray, C.

- 2004 *The Historic Backcountry: A Geographic Guide to the Historic Places of the San Diego County Mountains and the Colorado Desert*. Chris Wray Publications. Tierra Blanca Books. La Mesa, California.

Zimmerman, L.C., M.P. O'Conner, S.J. Bulova, J.R. Spotila, S.J. Kemp, and C.J. Salice.

- 1994 Thermal Ecology of Desert Tortoise in the Eastern Mojave Desert: Seasonal Patterns of Operative and Body Temperatures, and Microhabitat Utilization. *Herpetol. Monogr.* Volume 8. Pp. 45-59.



Land Status

- Planning Area
- Surface Water
- Bureau of Land Management
- Bureau of Land Management Wilderness
- Bureau of Reclamation
- Military
- State
- National Park Service
- Indian Reservation
- US Fish and Wildlife



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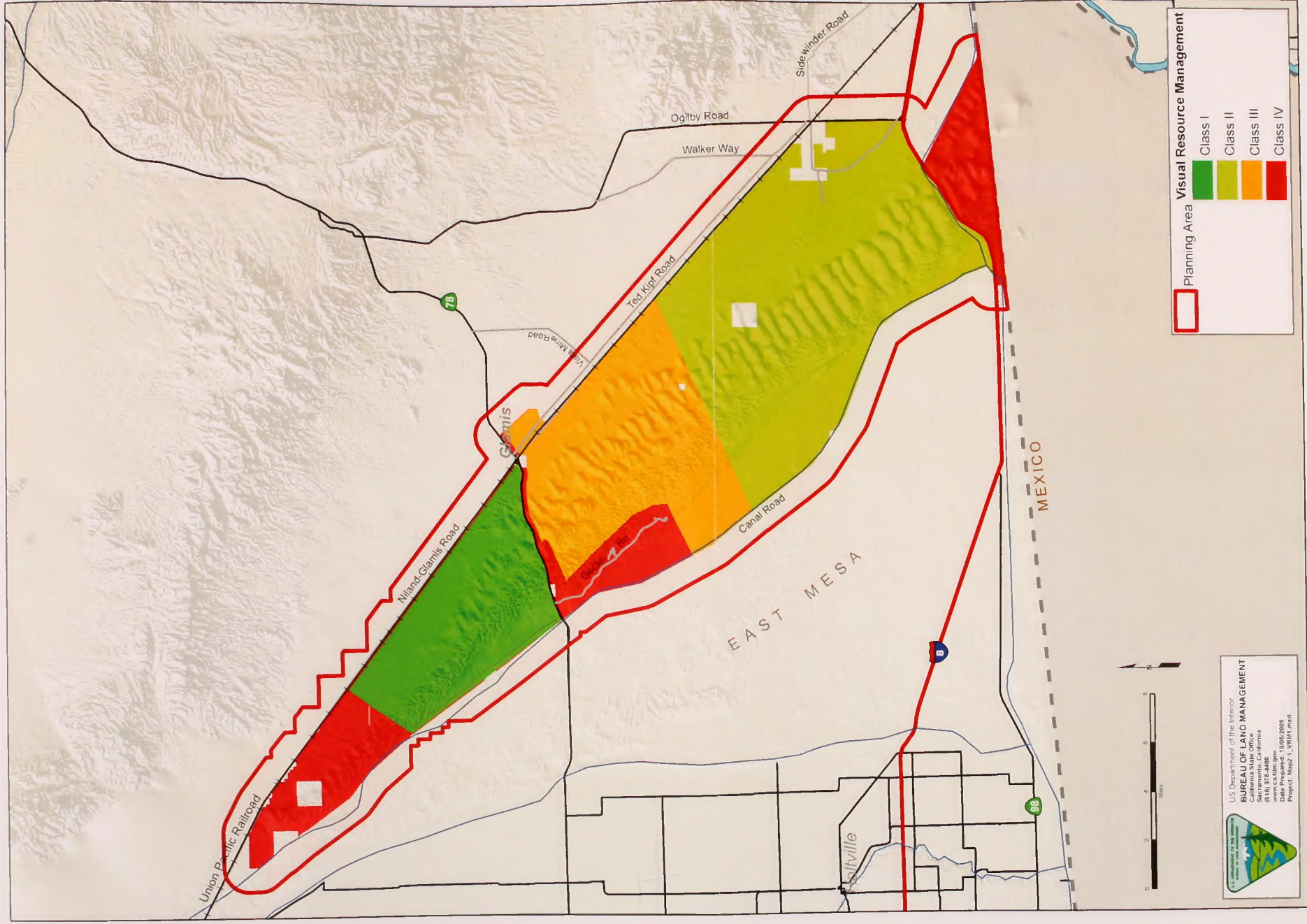
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MAP 1-1: Planning Area

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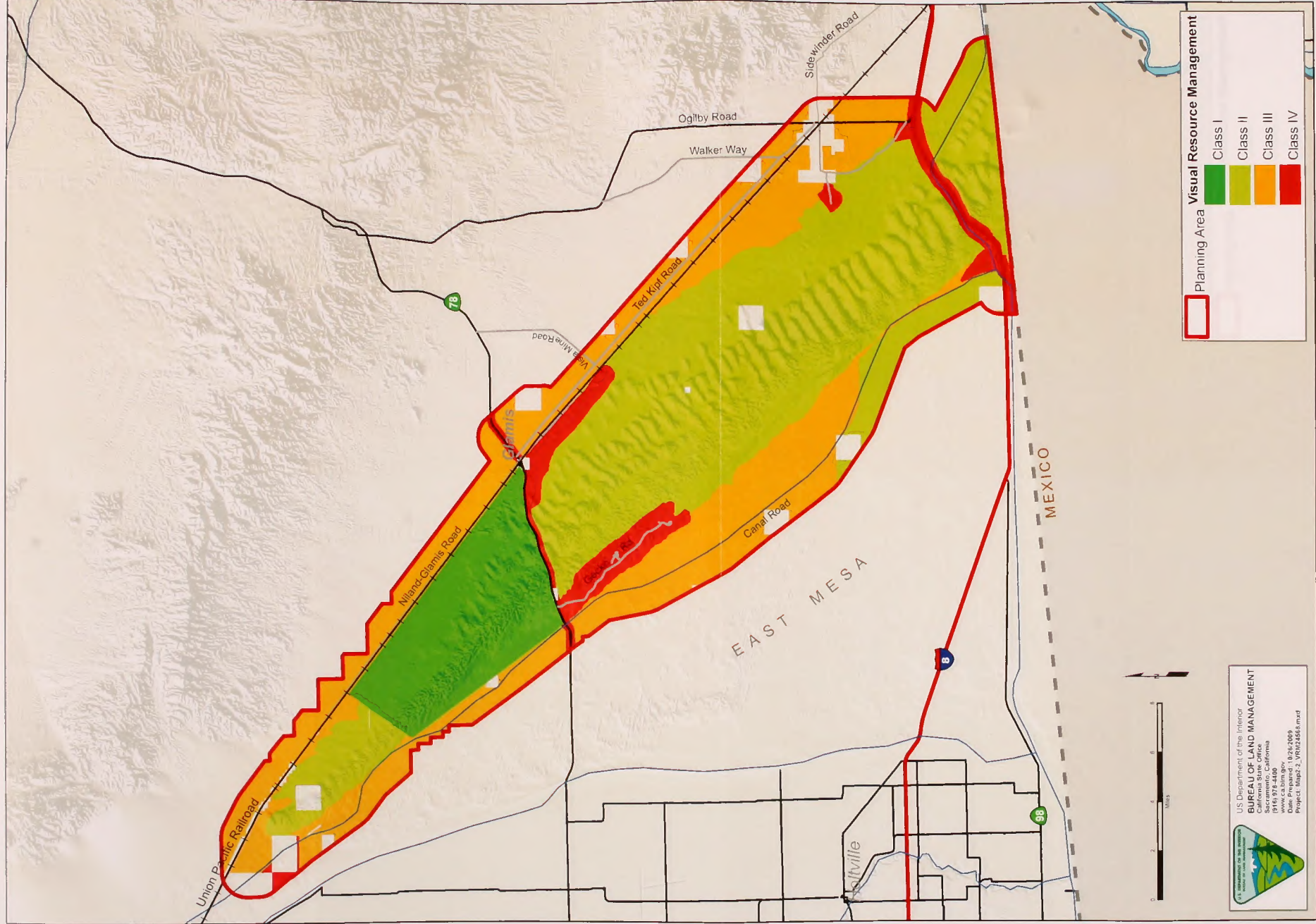
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MAP 2-1: Visual Resource Management Alternative 1



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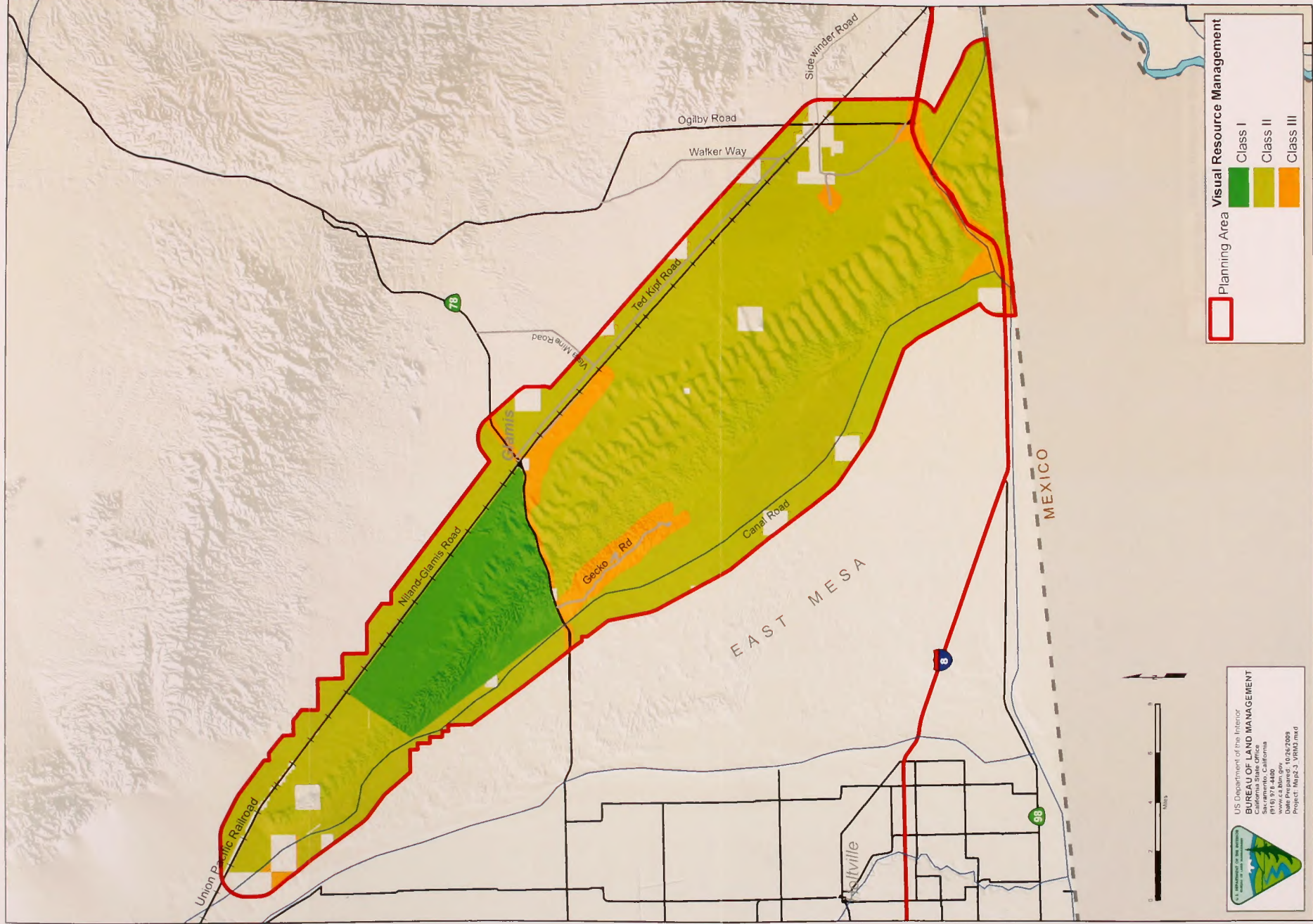


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MAP 2-2: Visual Resource Management
 Alternatives 2, 4, 5, 6 & 8

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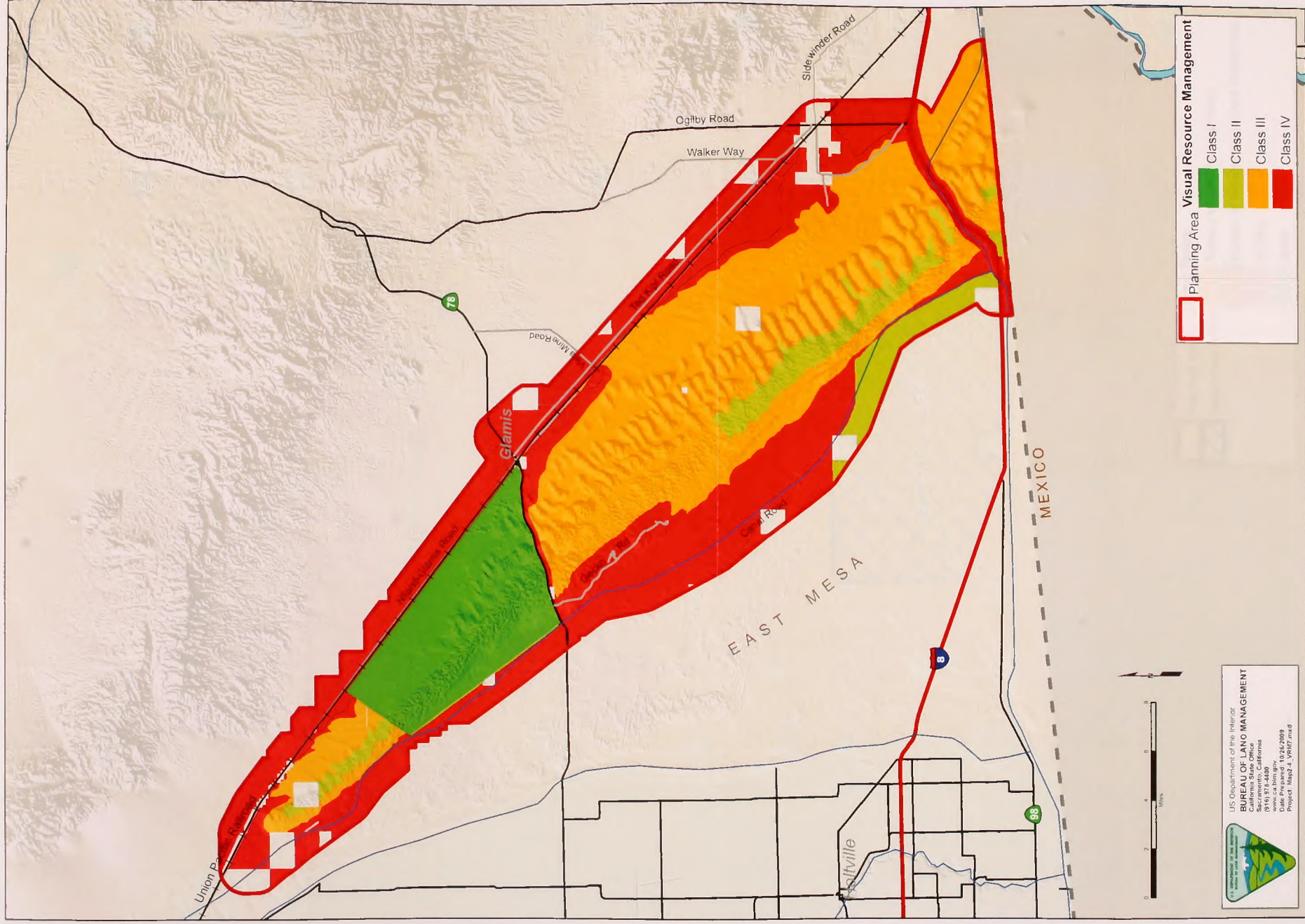
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**MAP 2-3: Visual Resource Management
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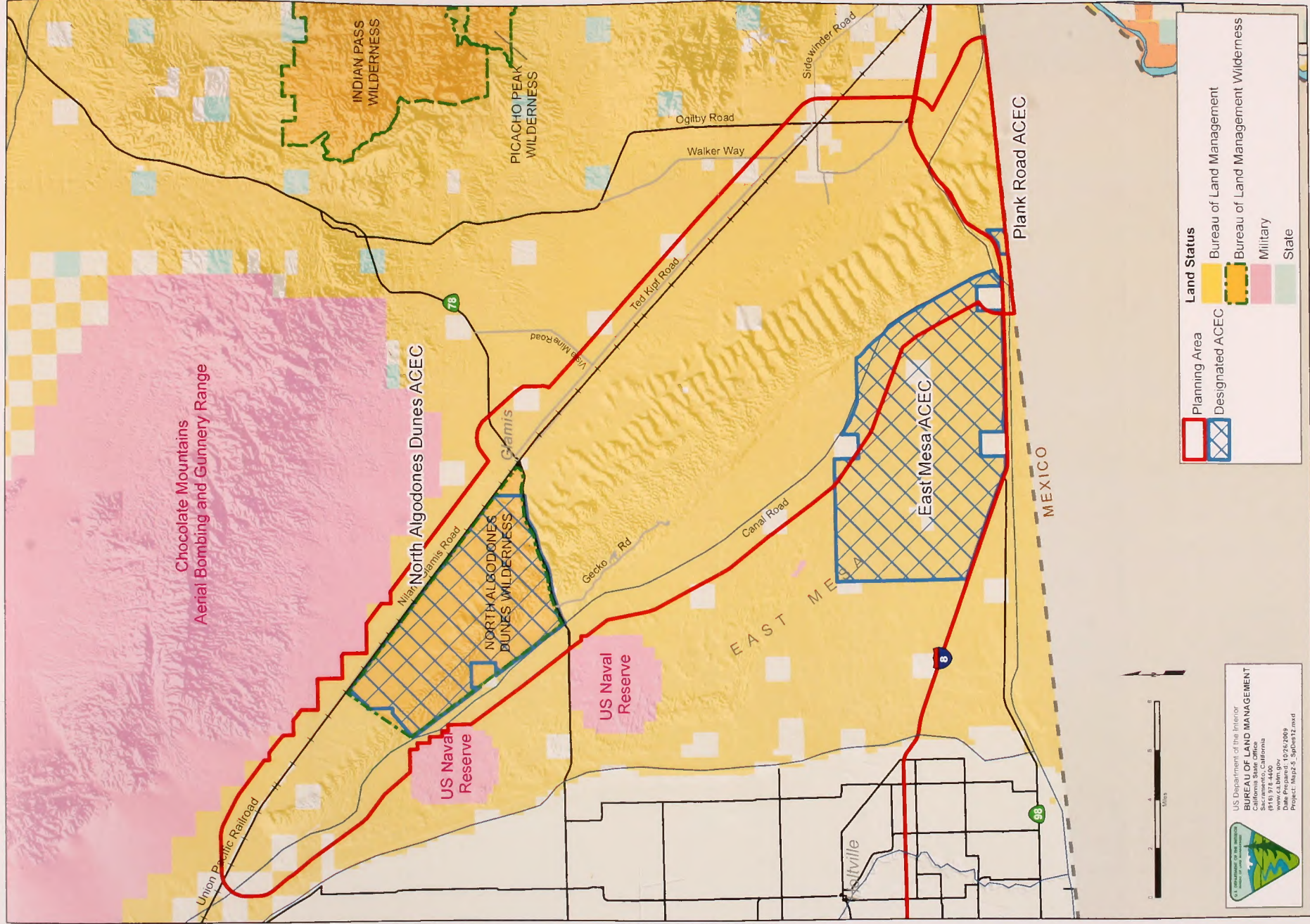
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**MAP 2-4: Visual Resource Management
Alternative 7**



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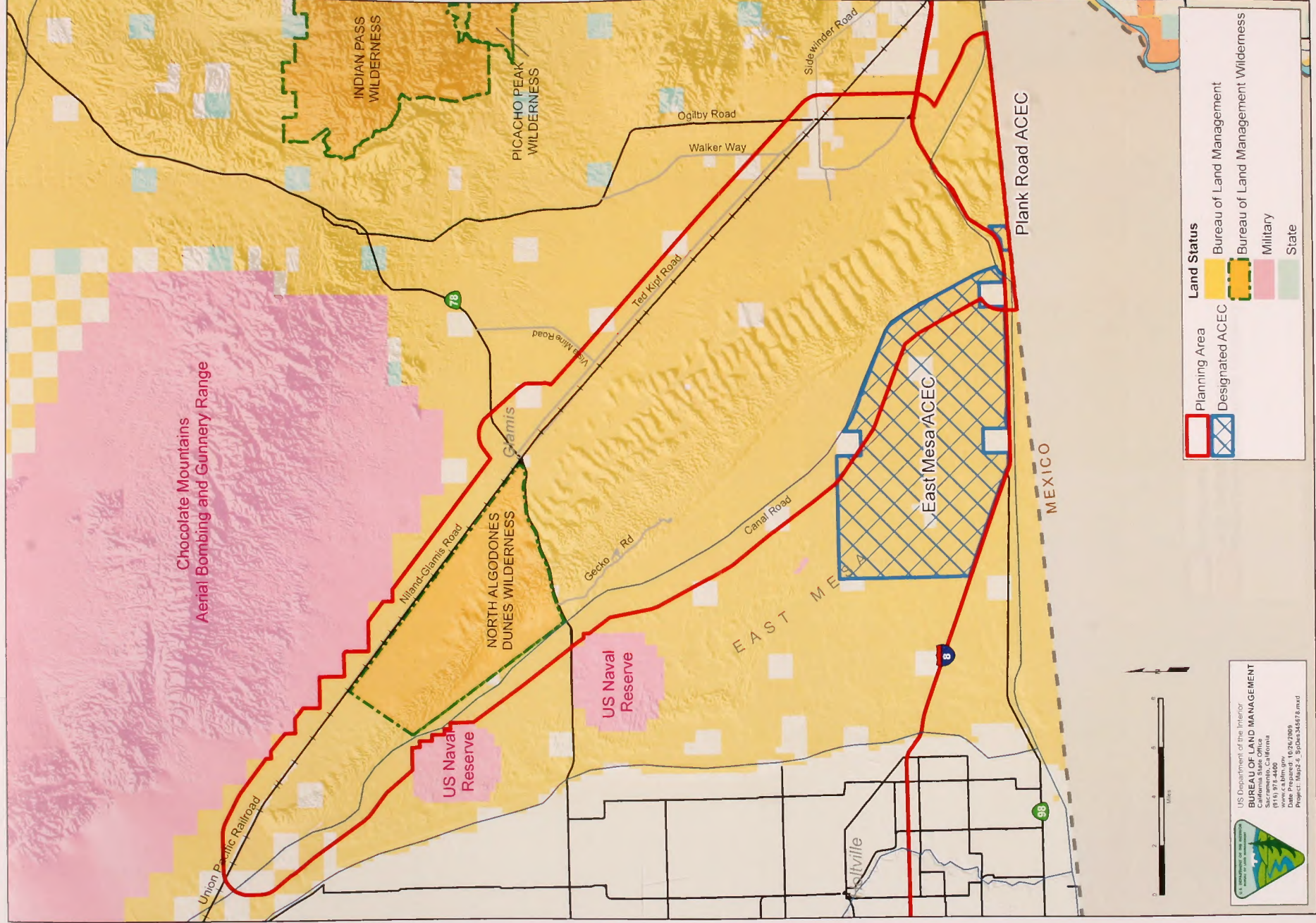


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MAP 2-5: Special Designations
Alternatives 1 & 2

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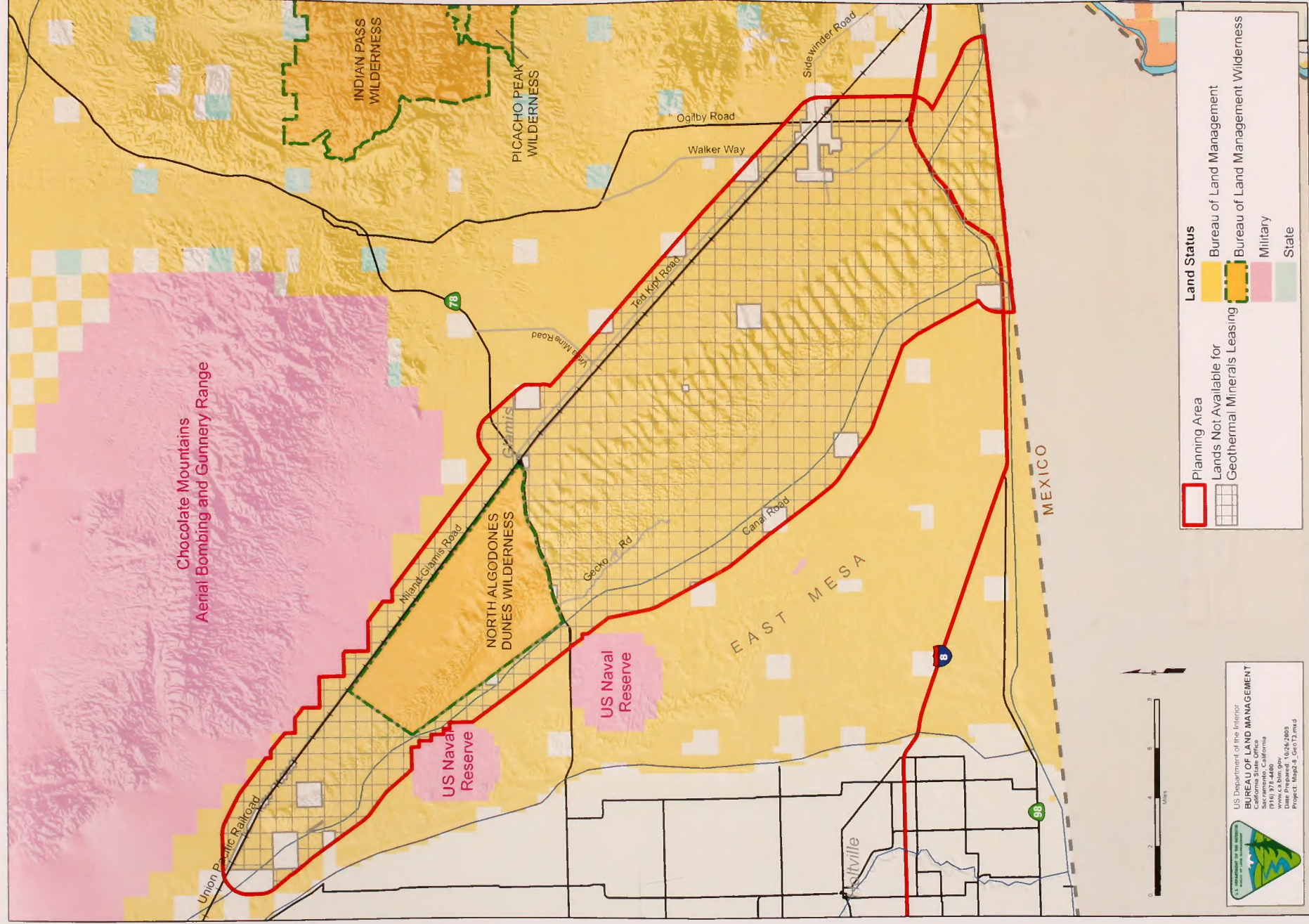
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MAP 2-6: Special Designations
Alternatives 3, 4, 5, 6, 7 & 8

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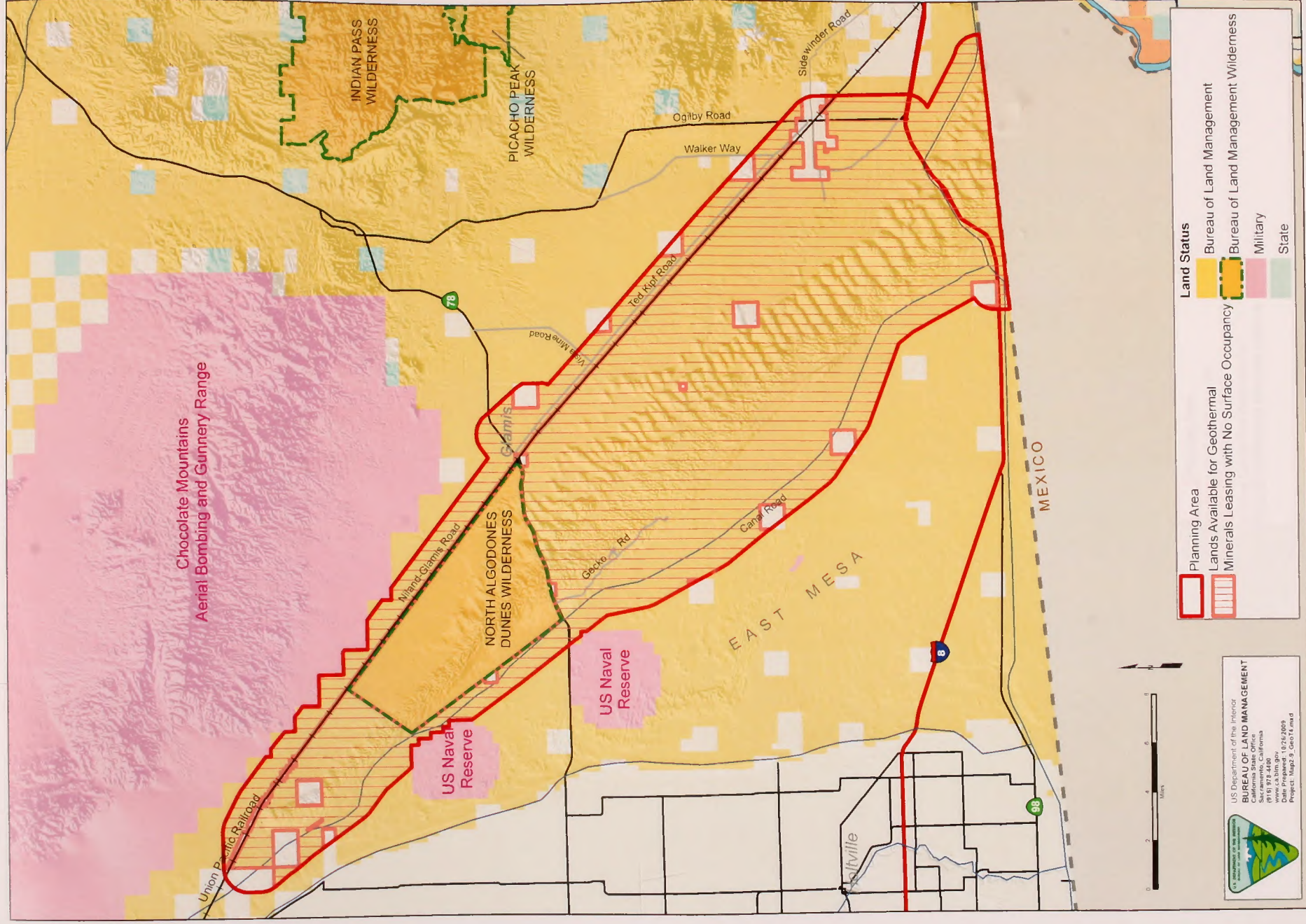
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MAP 2-8: Lands Available for Geothermal Minerals Leasing
Alternative 3

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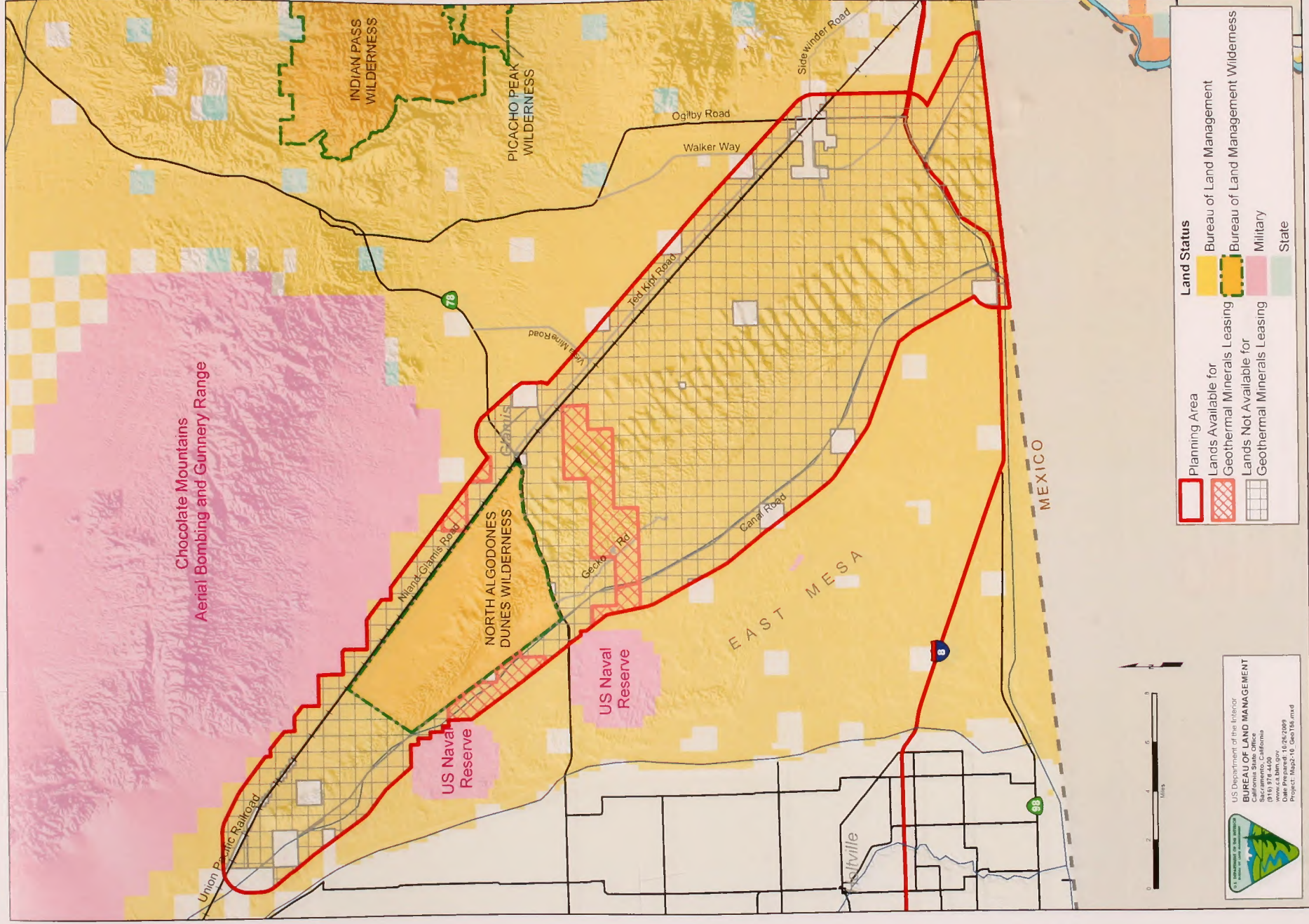
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MAP 2-9: Lands Available for Geothermal Minerals Leasing
Alternative 4

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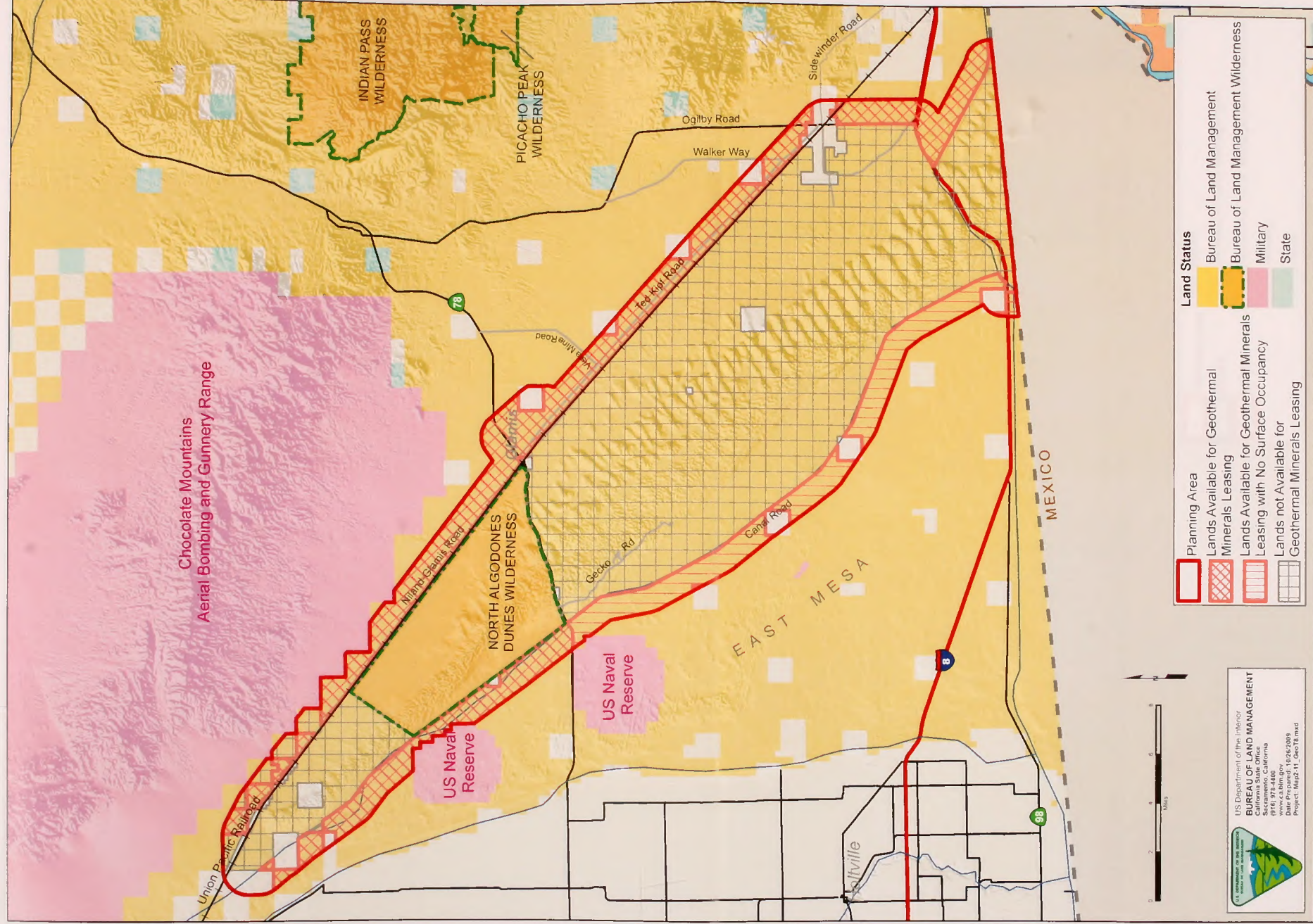


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MAP 2-10: Lands Available for Geothermal Minerals Leasing Alternatives 5 & 6

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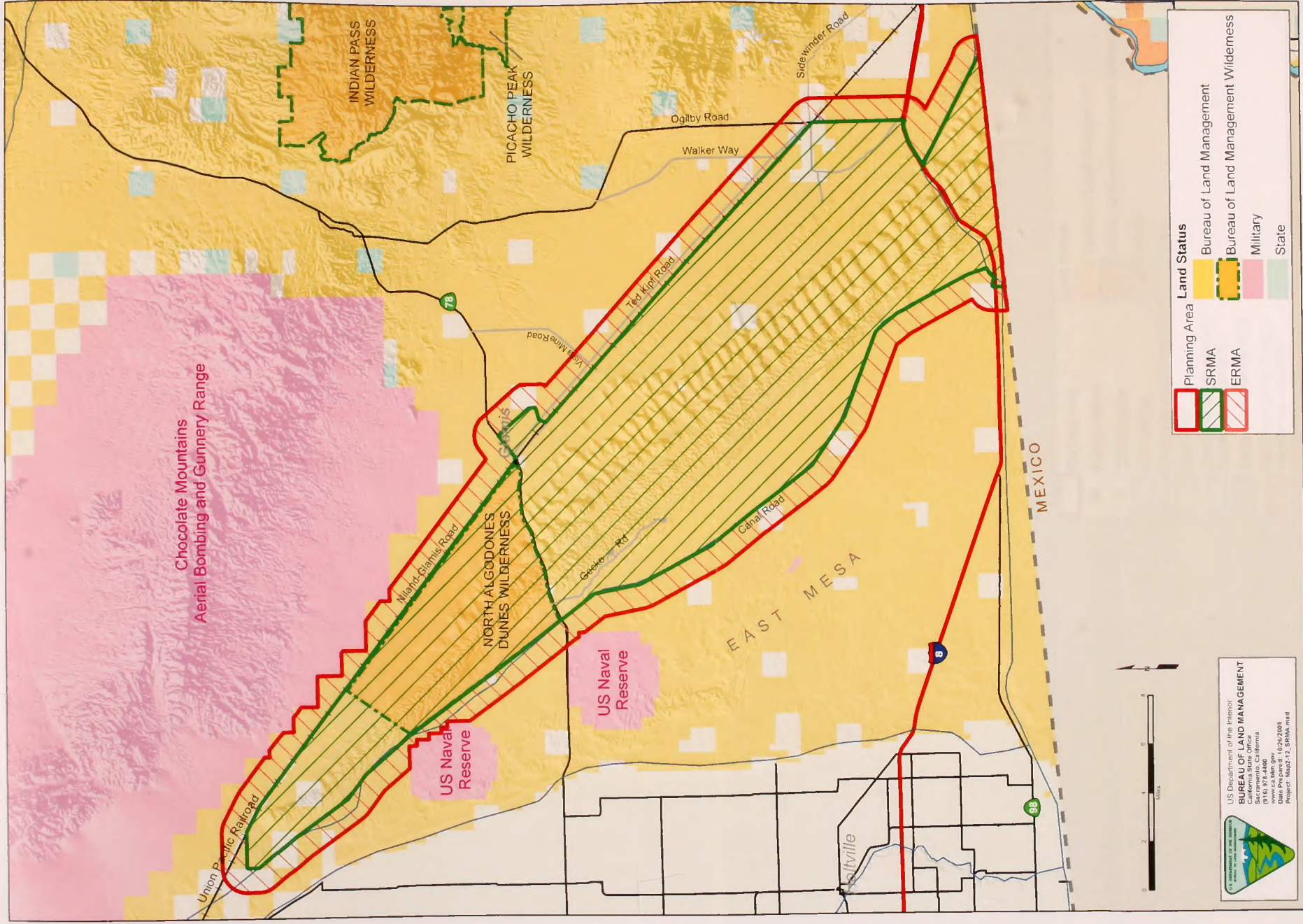


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MAP 2-11: Lands Available for Geothermal Minerals Leasing Alternative 8

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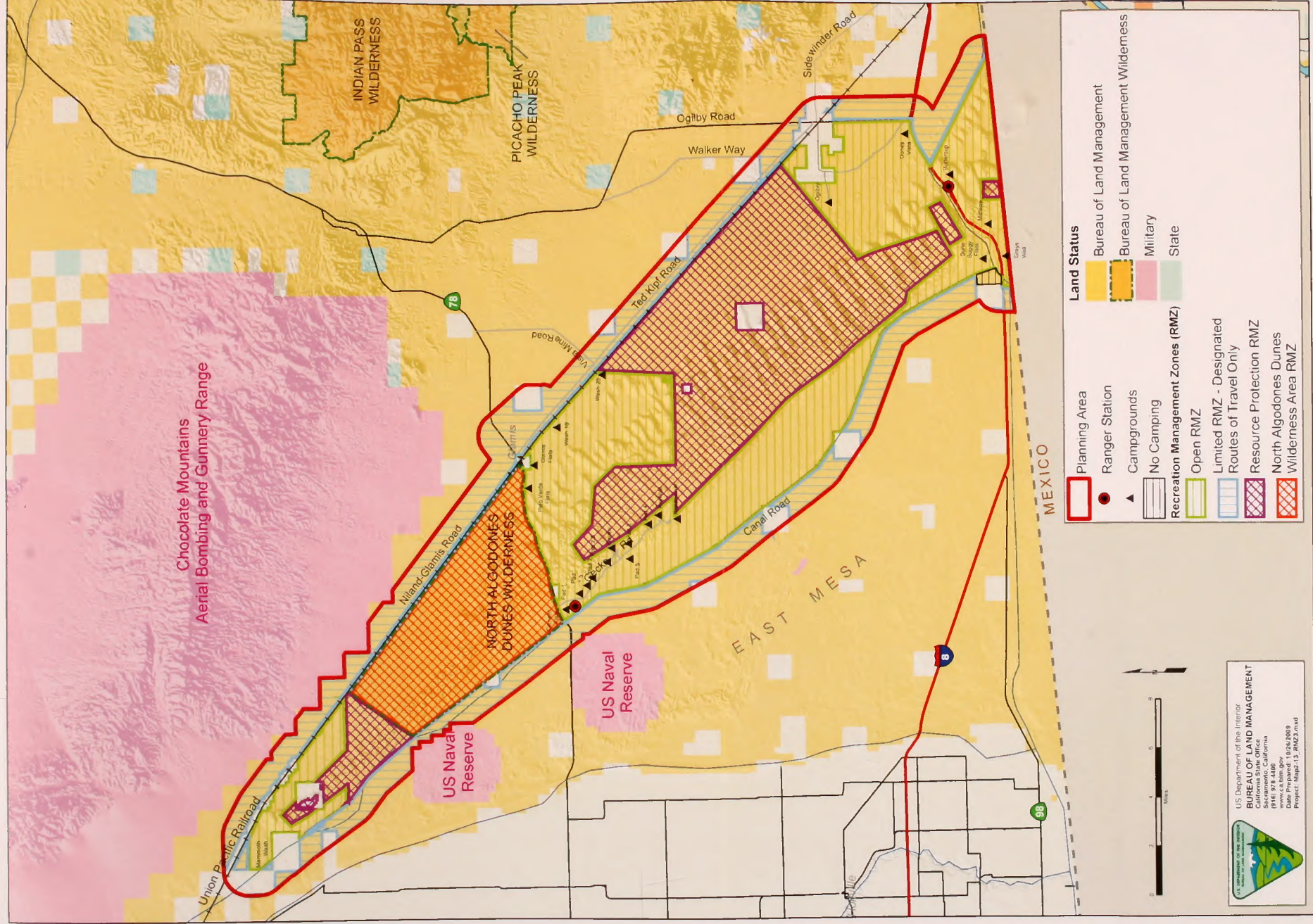
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**MAP 2-12: Special Recreation
Management Areas (SRMA & ERMA)
All Alternatives**



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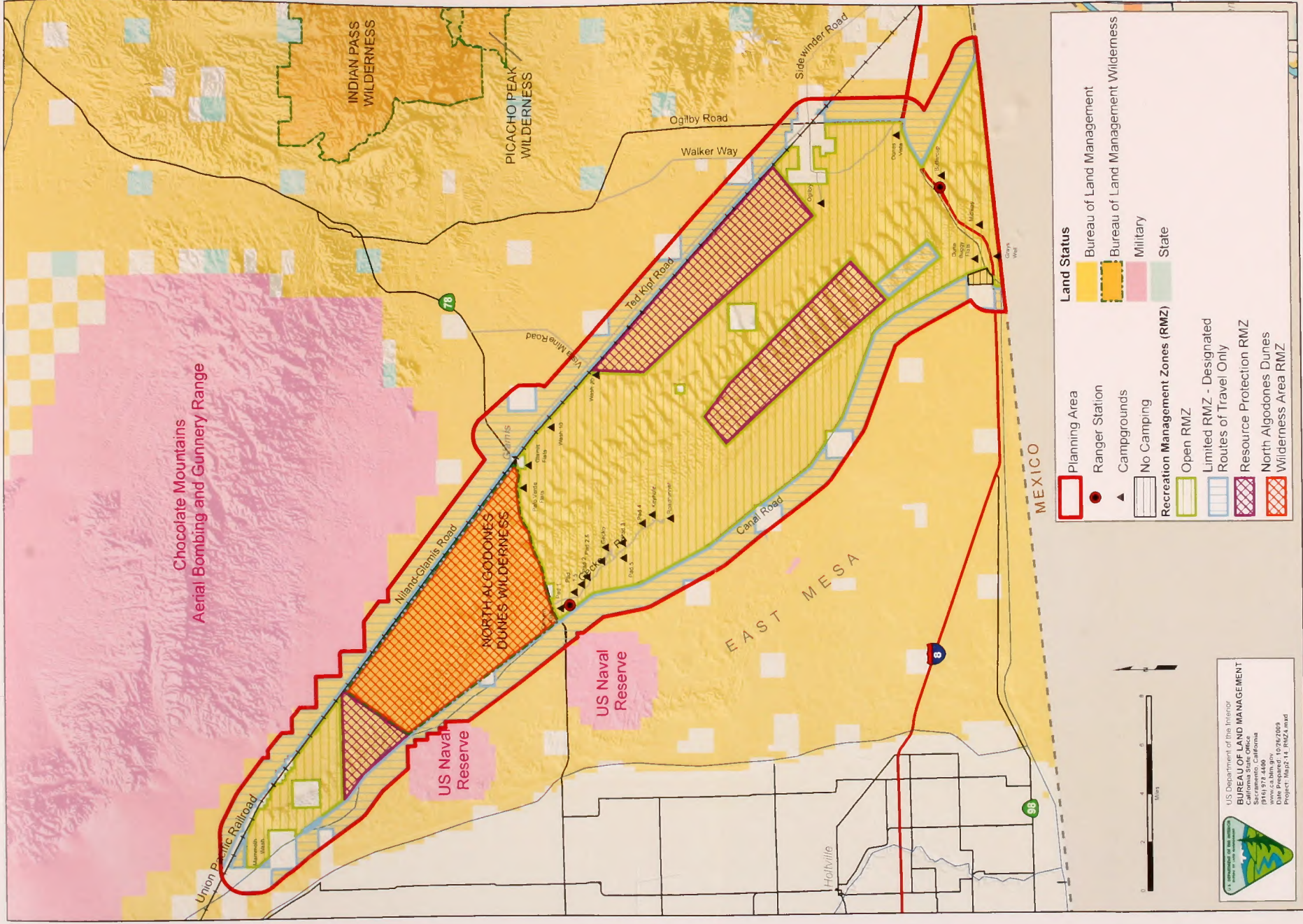
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MAP 2-13: Recreation Management Zones
Alternative 3



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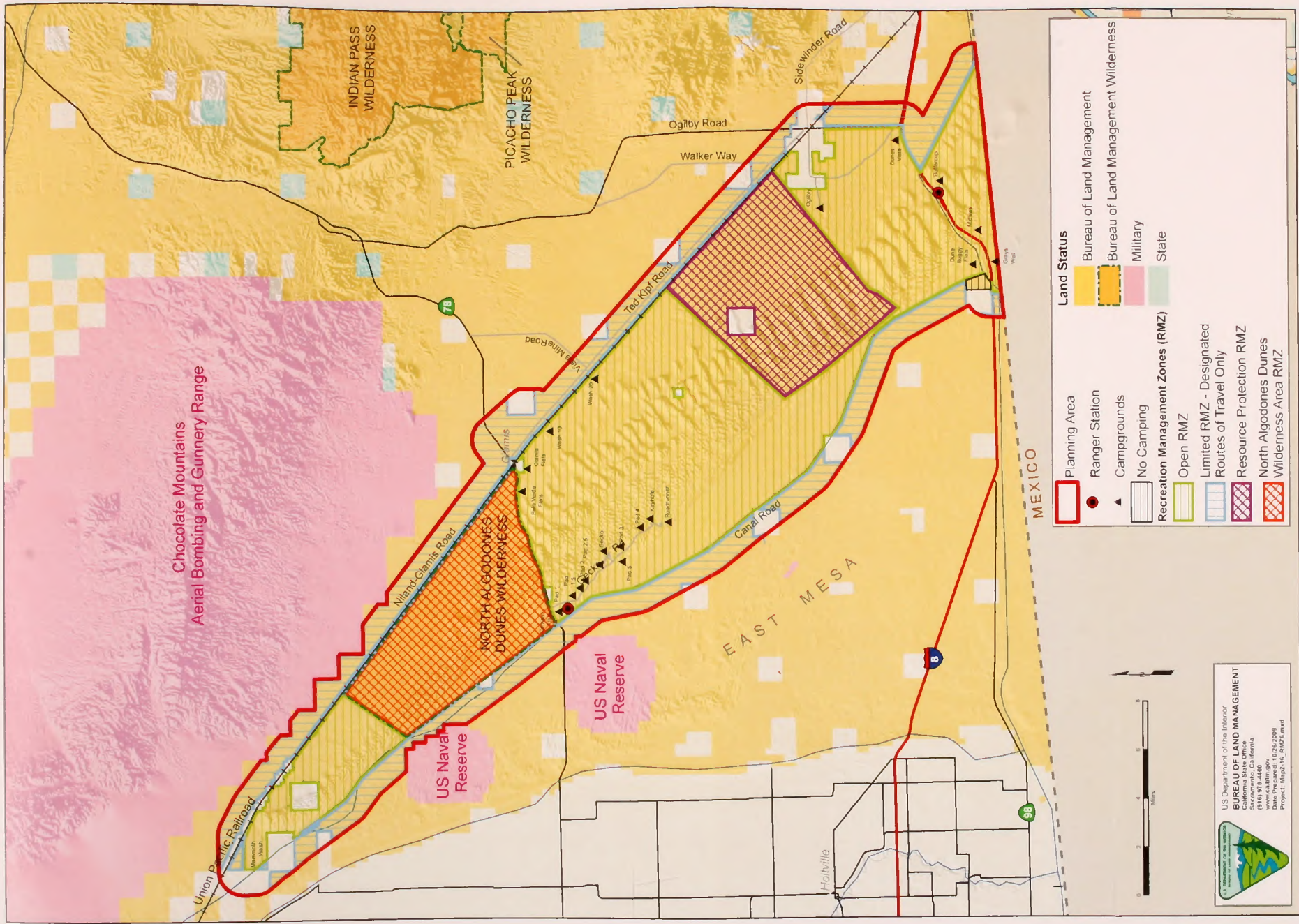
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**MAP 2-14: Recreation Management Zones
Alternative 4**



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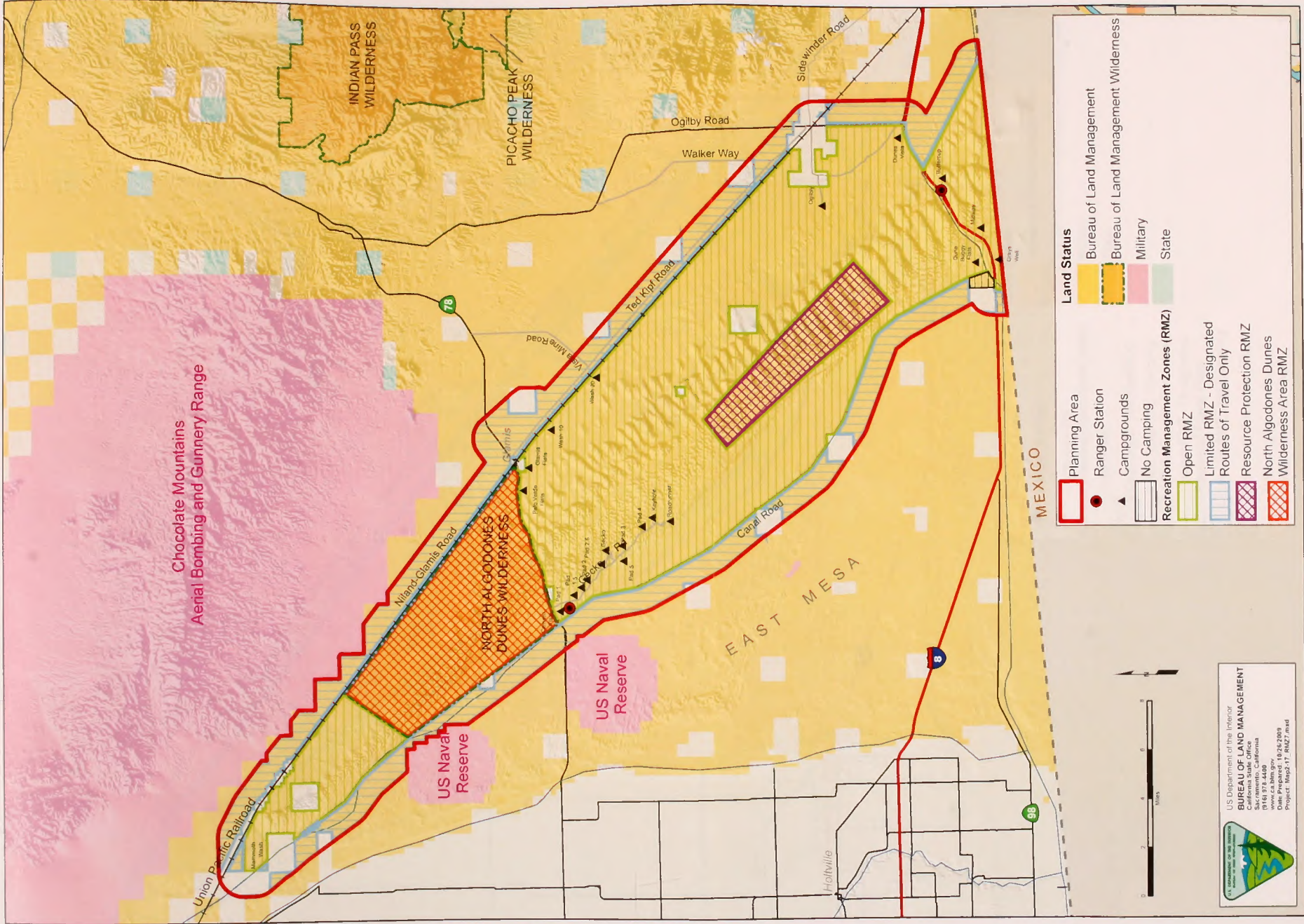
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MAP 2-16: Recreation Management Zones
Alternative 6

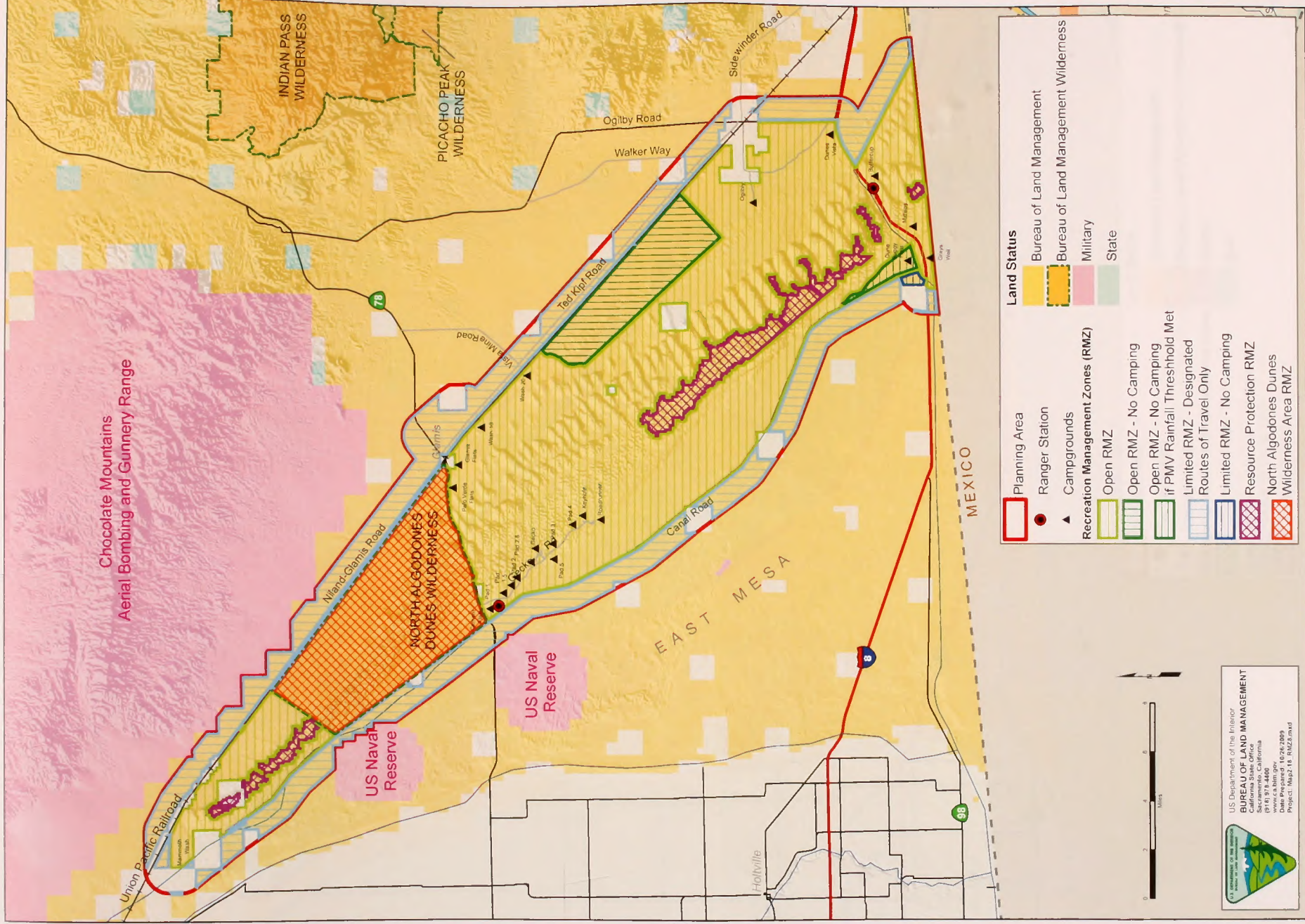


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MAP 2-17: Recreation Management Zones
Alternative 7



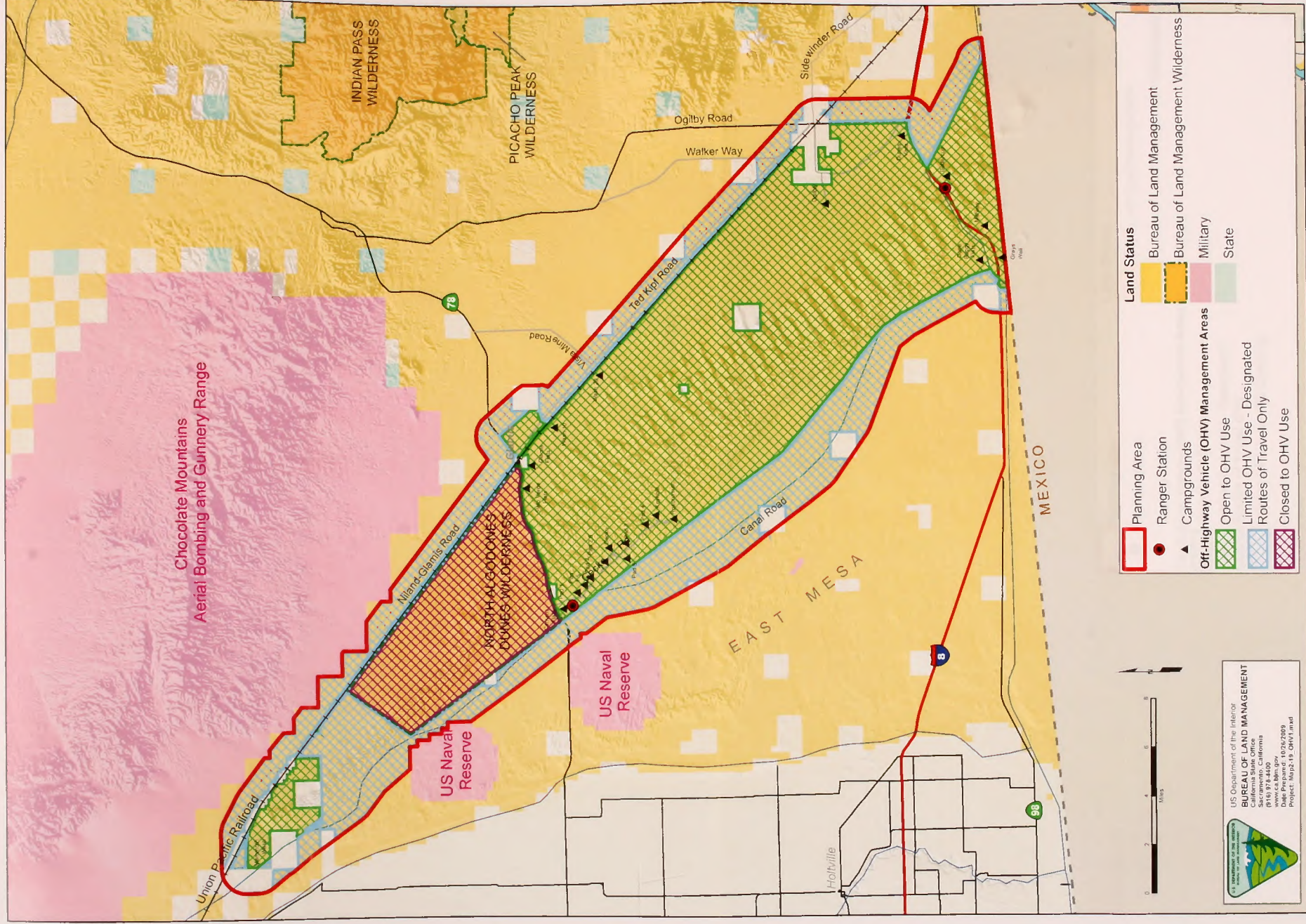
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MAP 2-18: Recreation Management Zones
Alternative 8



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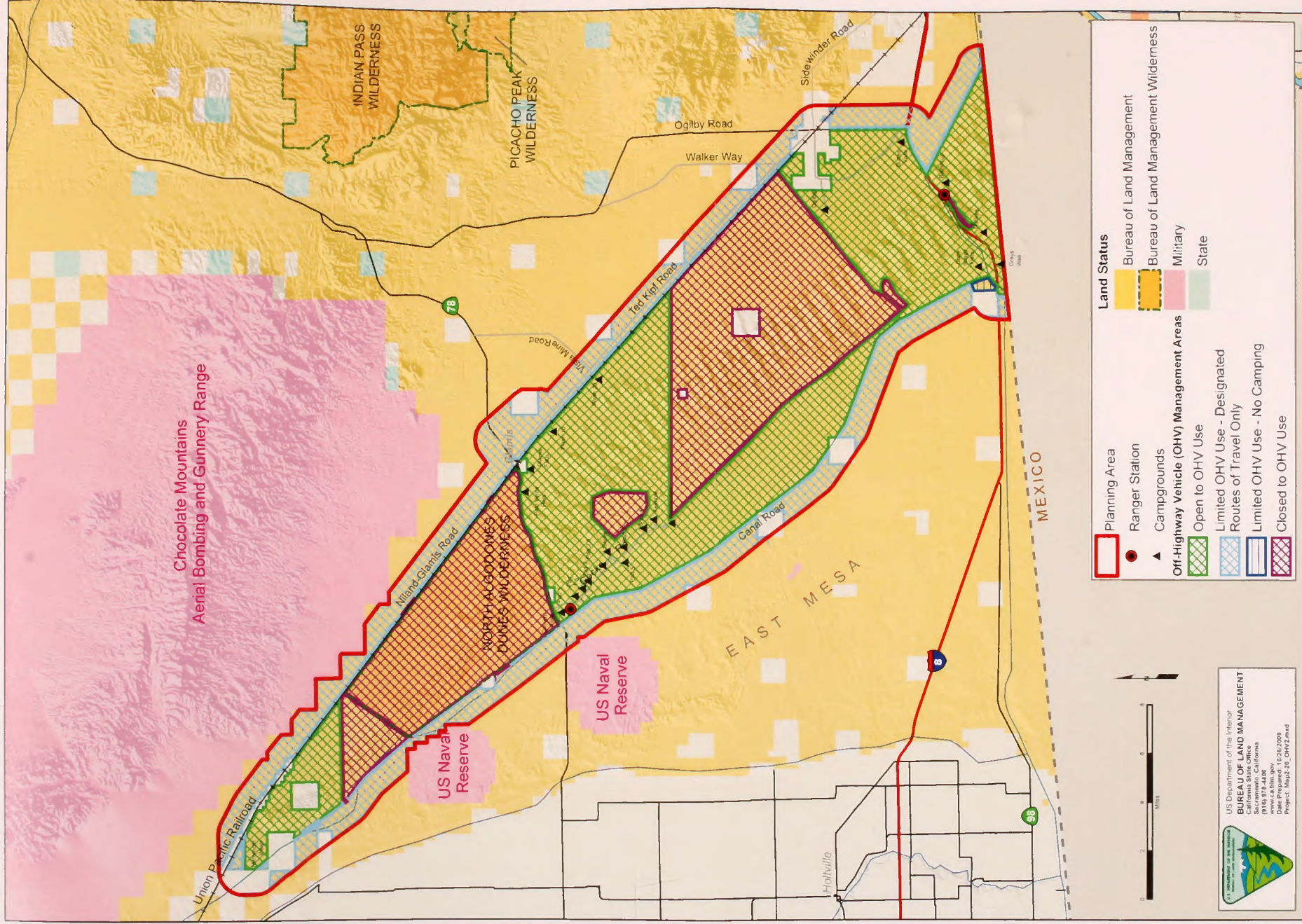
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MAP 2-19: OHV Management Areas **Alternative 1**



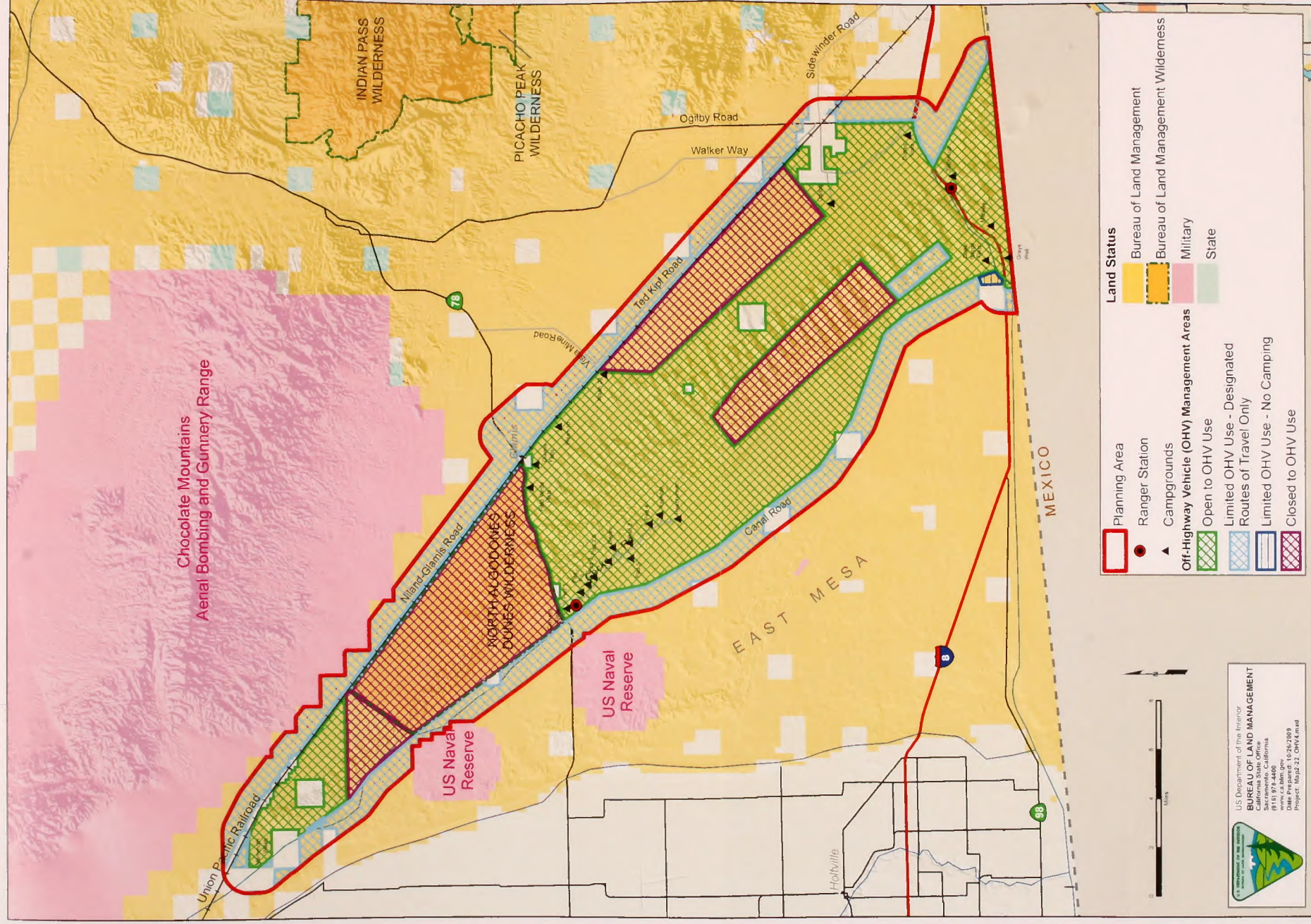


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MAP 2-20: OHV Management Areas
Alternative 2

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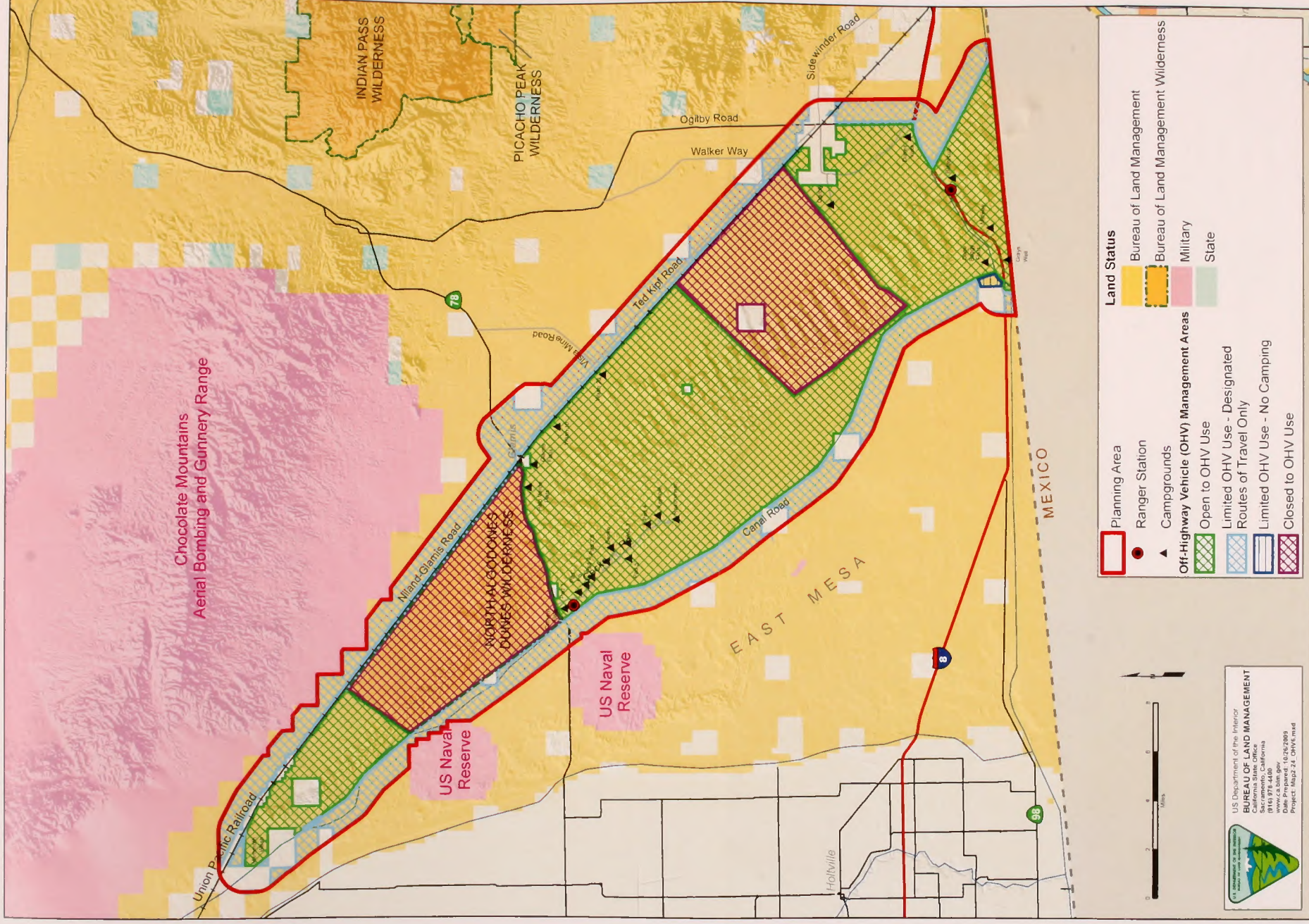
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MAP 2-22: OHV Management Areas **Alternative 4**



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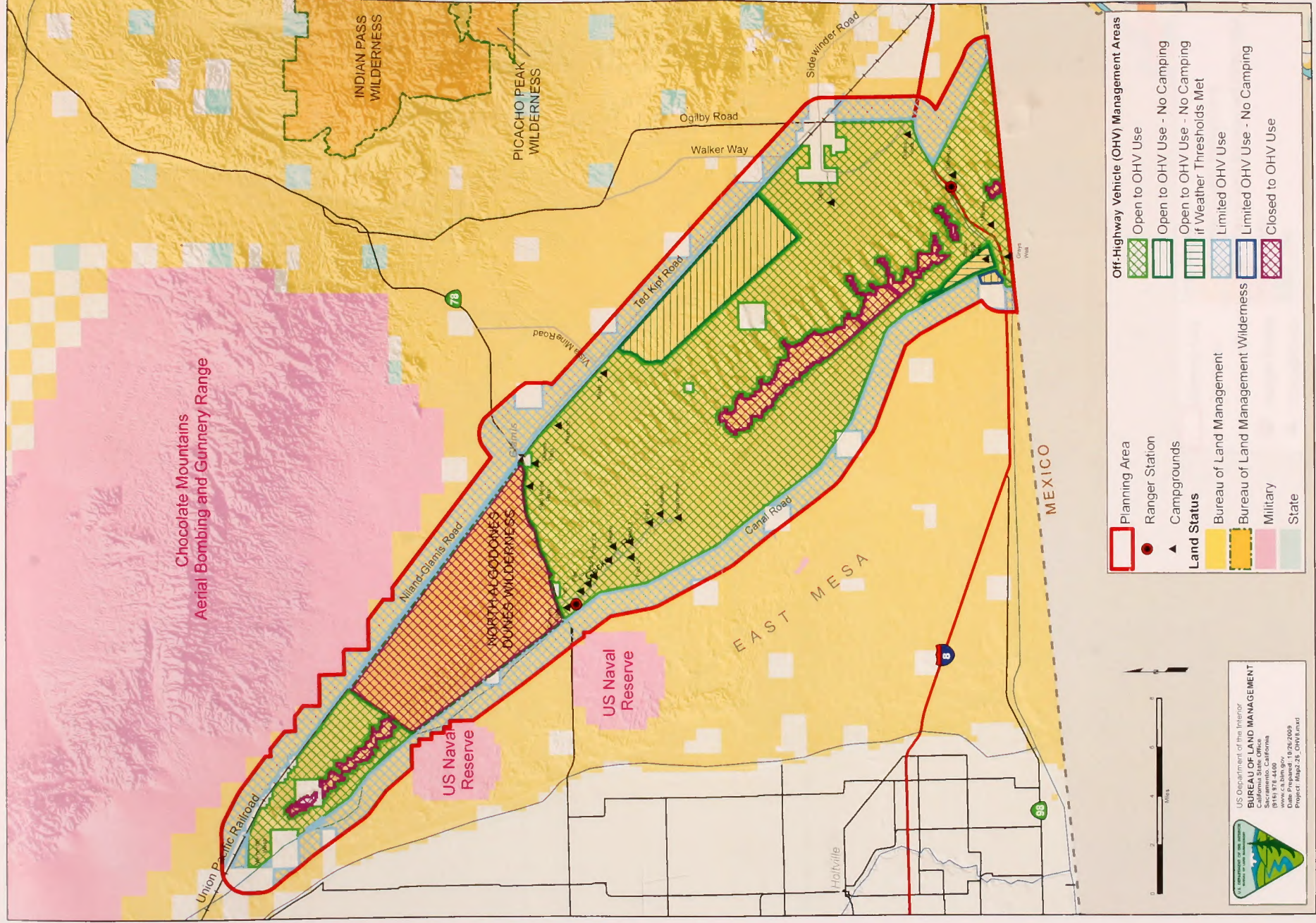
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**MAP 2-24: OHV Management Areas
 Alternative 6**

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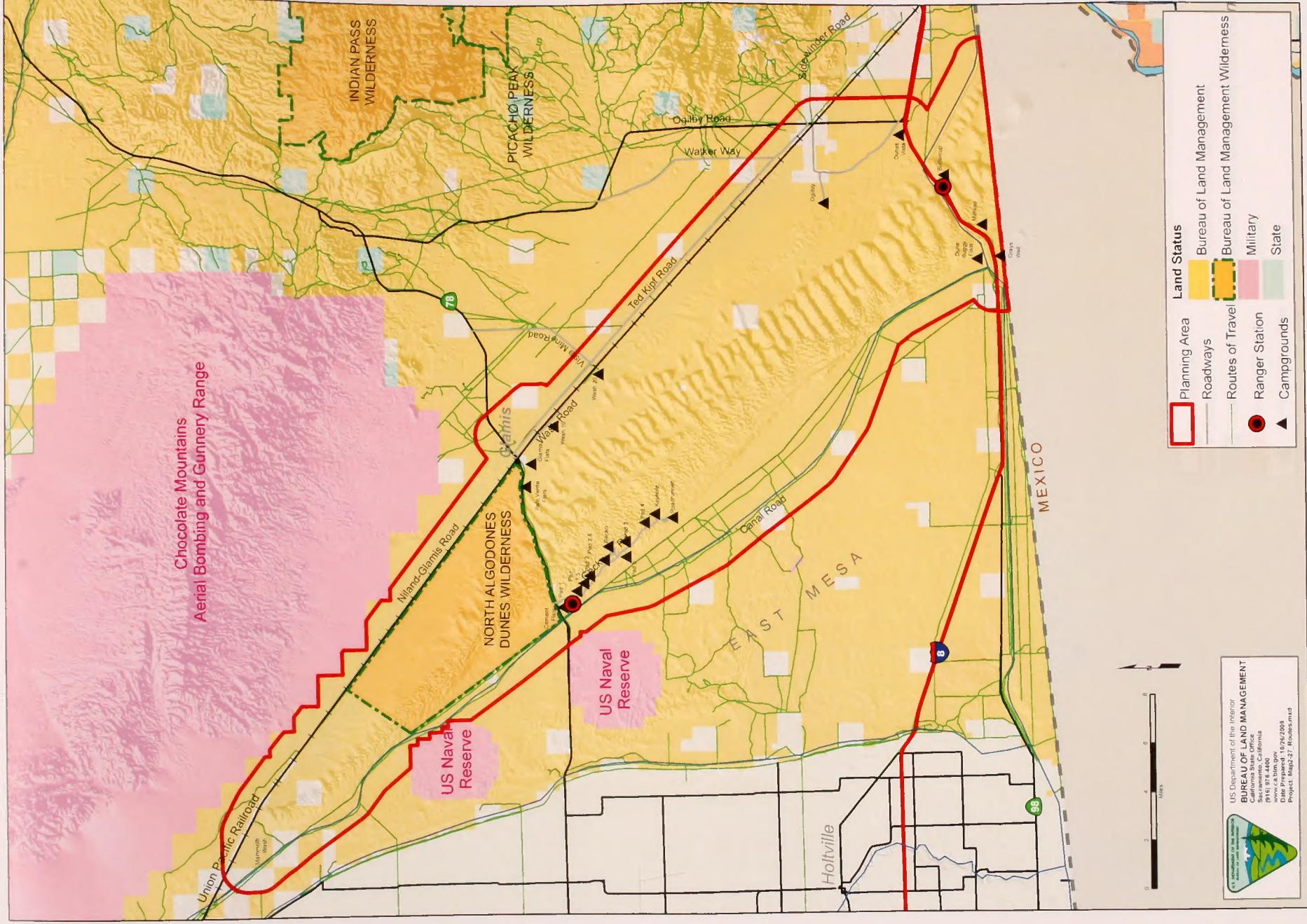
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MAP 2-26: OHV Management Areas
Alternative 8

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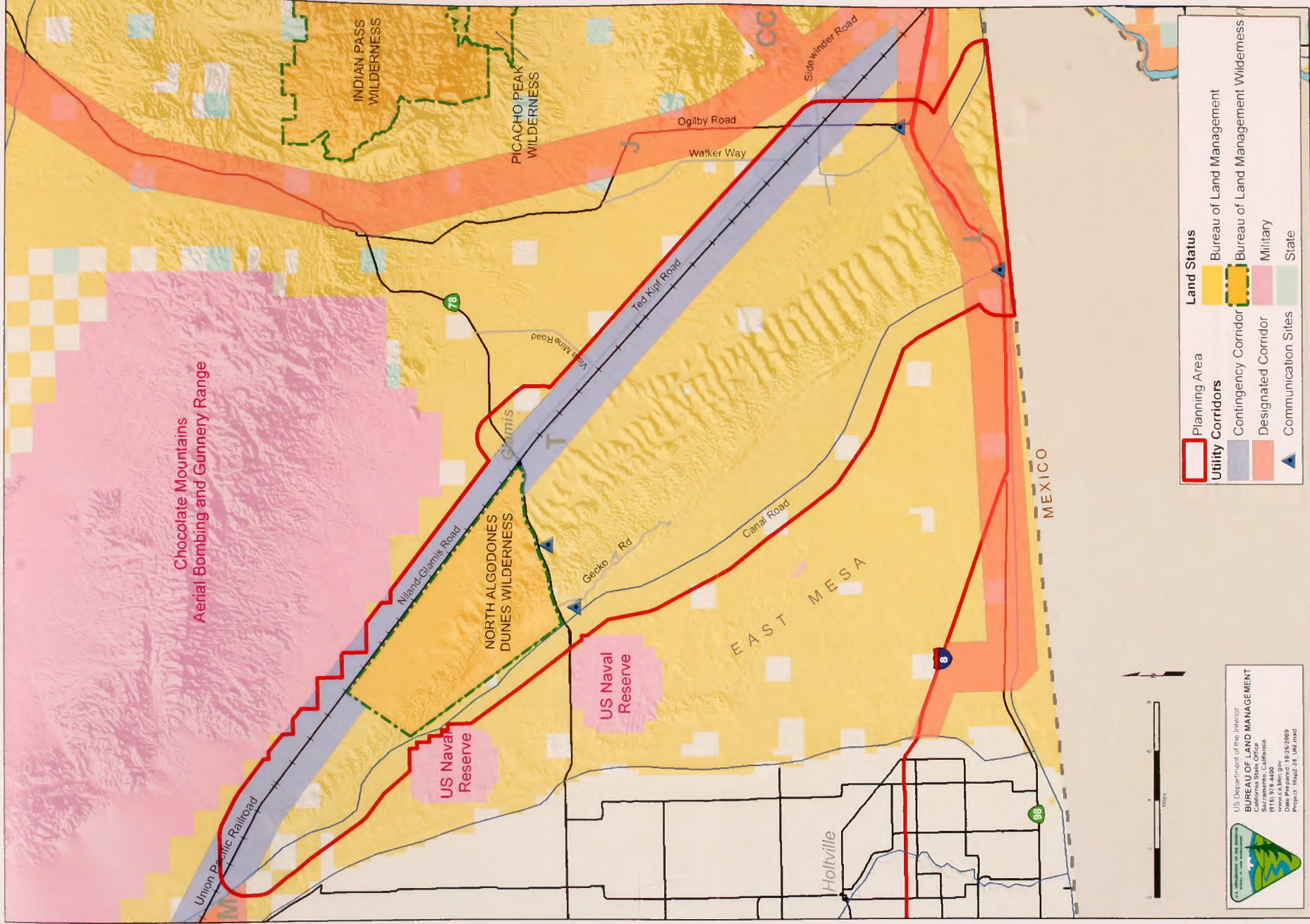
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MAP 2-27: Routes of Travel in the Planning Area

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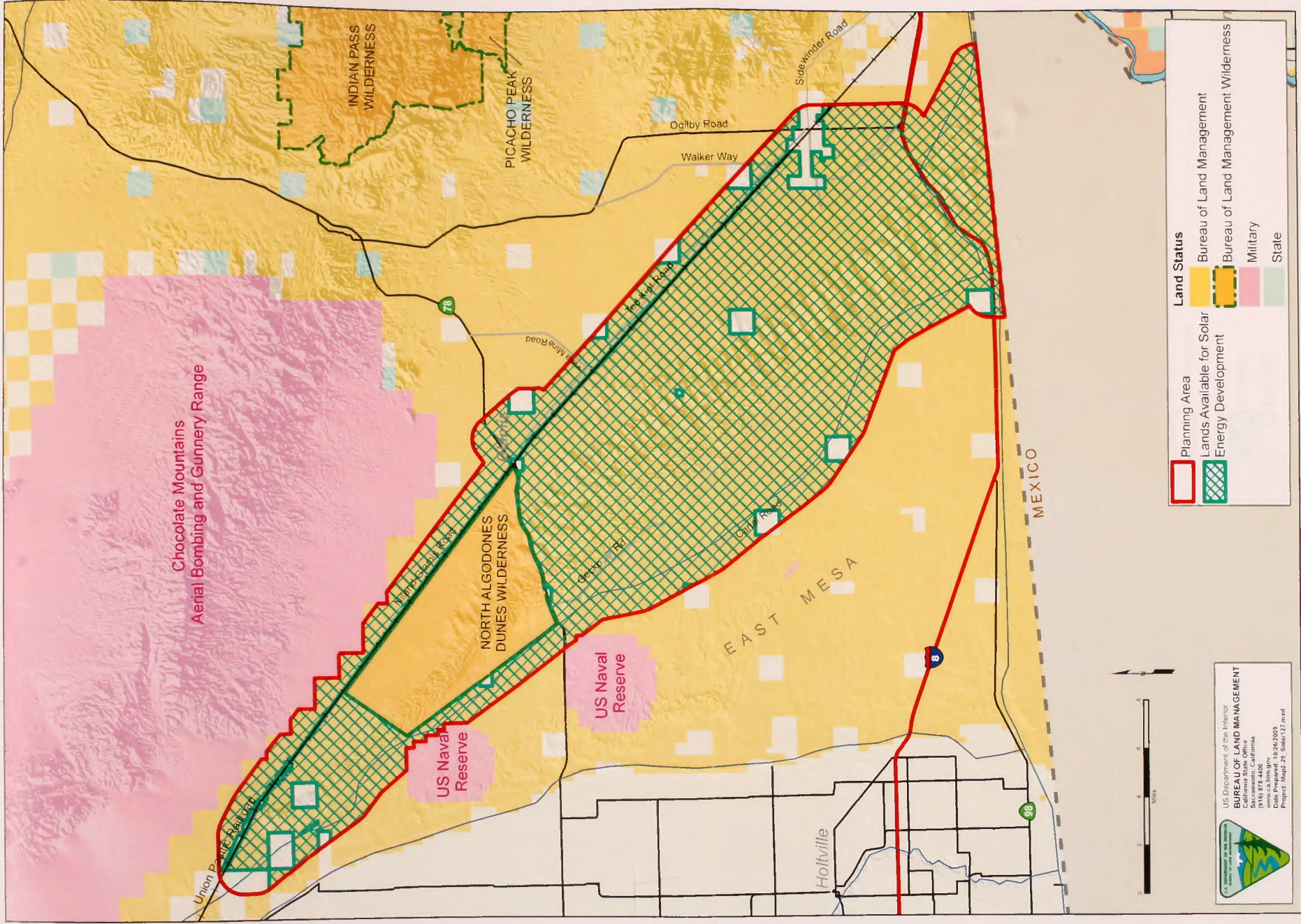
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MAP 2-28: Utility Corridors and Communication Sites All Alternatives



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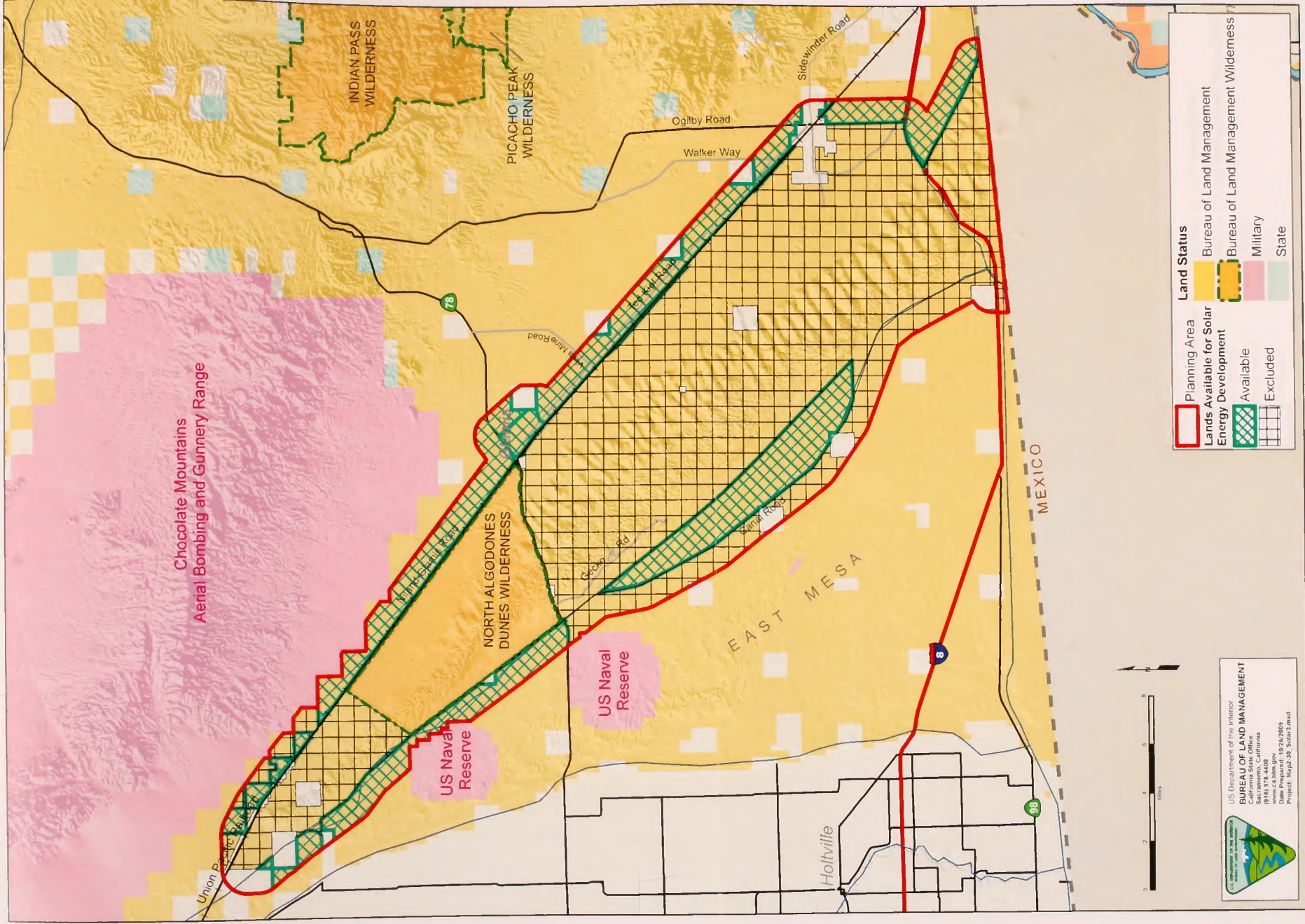
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MAP 2-29: Lands Available for Solar Energy Development Alternatives 1, 2 & 7



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Land Status

- Planning Area
- Lands Available for Solar Energy Development
- Available
- Excluded
- Bureau of Land Management
- Bureau of Land Management Wilderness
- Military
- State

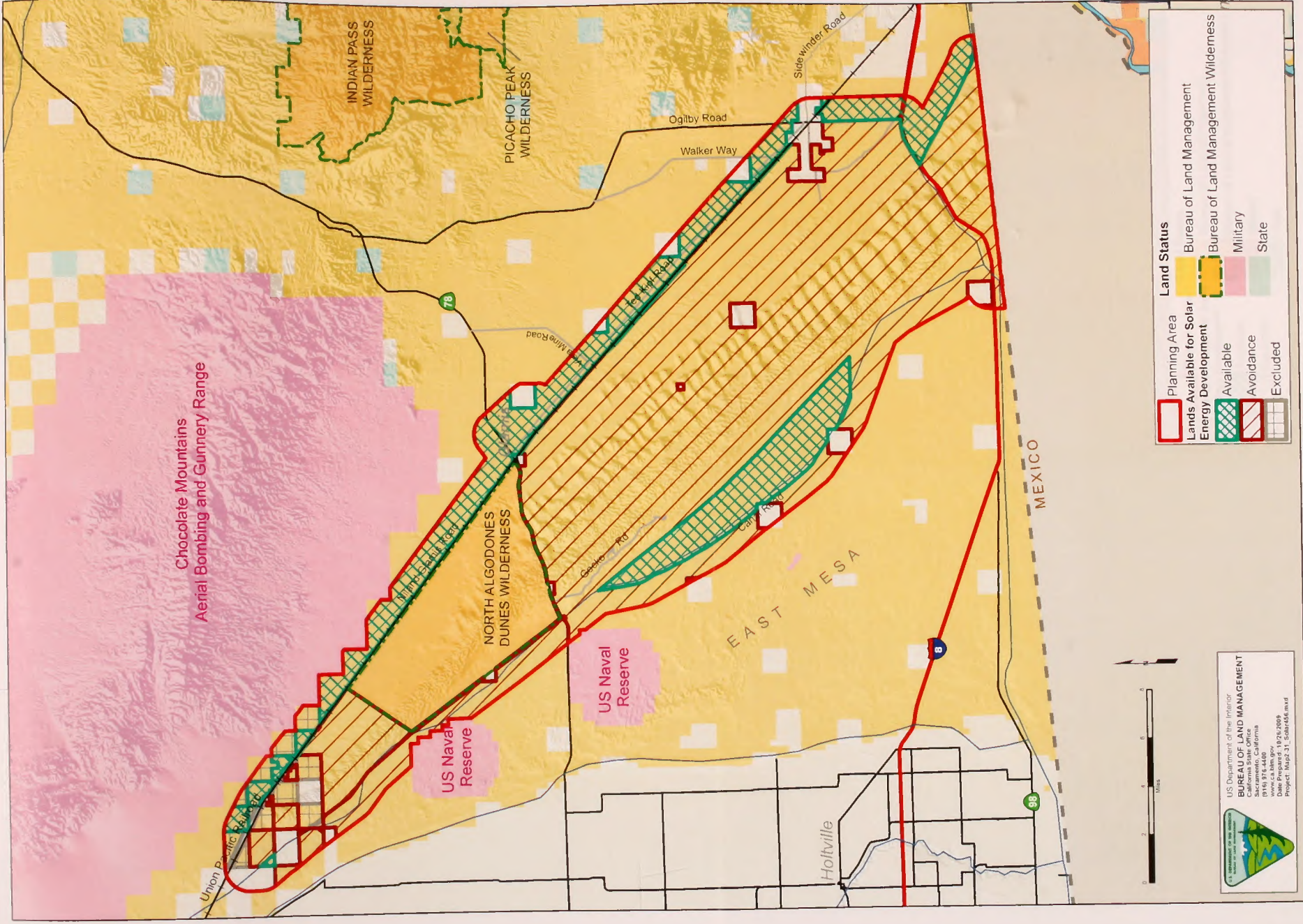


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**MAP 2-30: Lands Available for Solar Energy Development
 Alternative 3**

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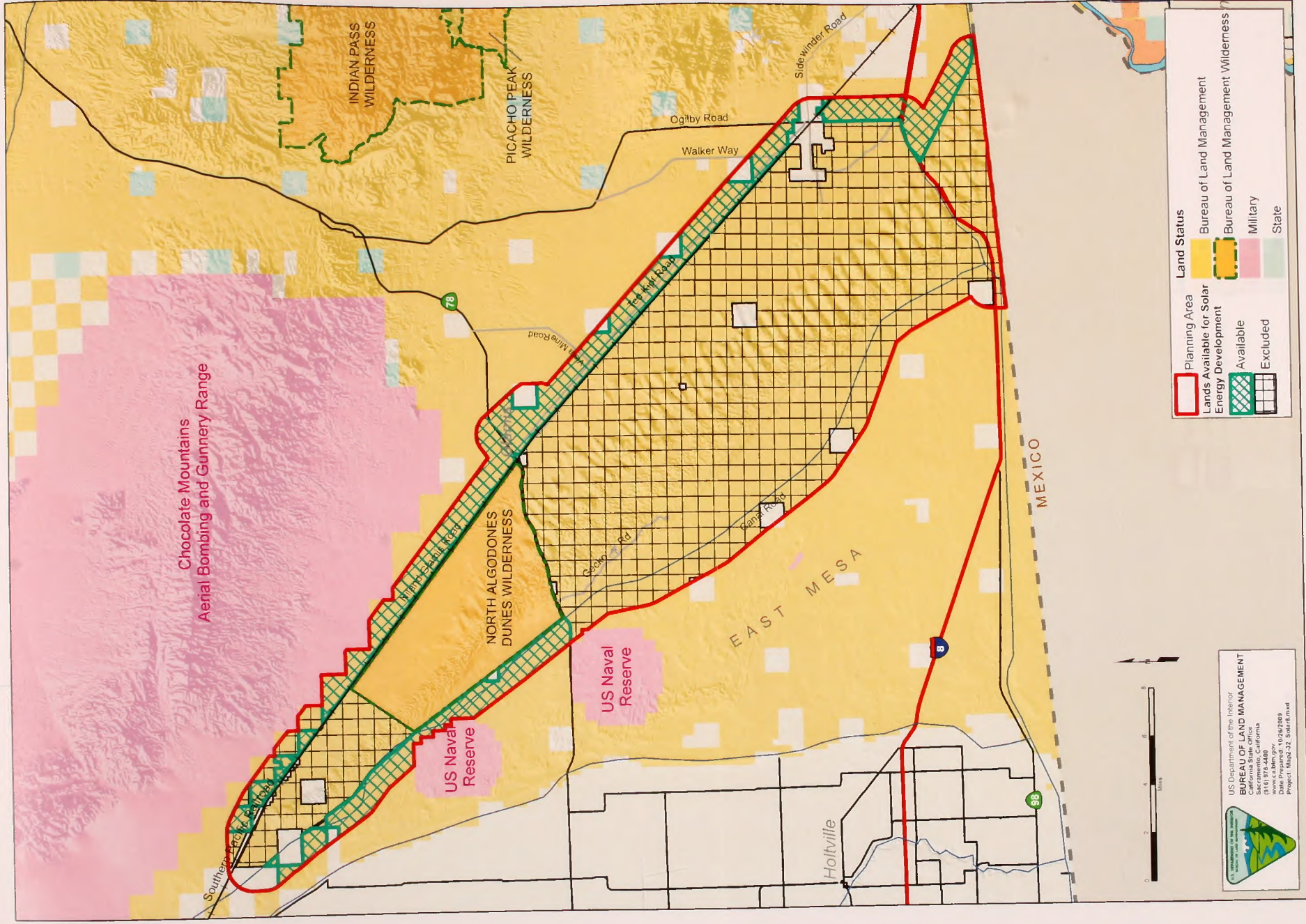
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**MAP 2-31: Lands Available for Solar Energy Development
Alternatives 4, 5 & 6**

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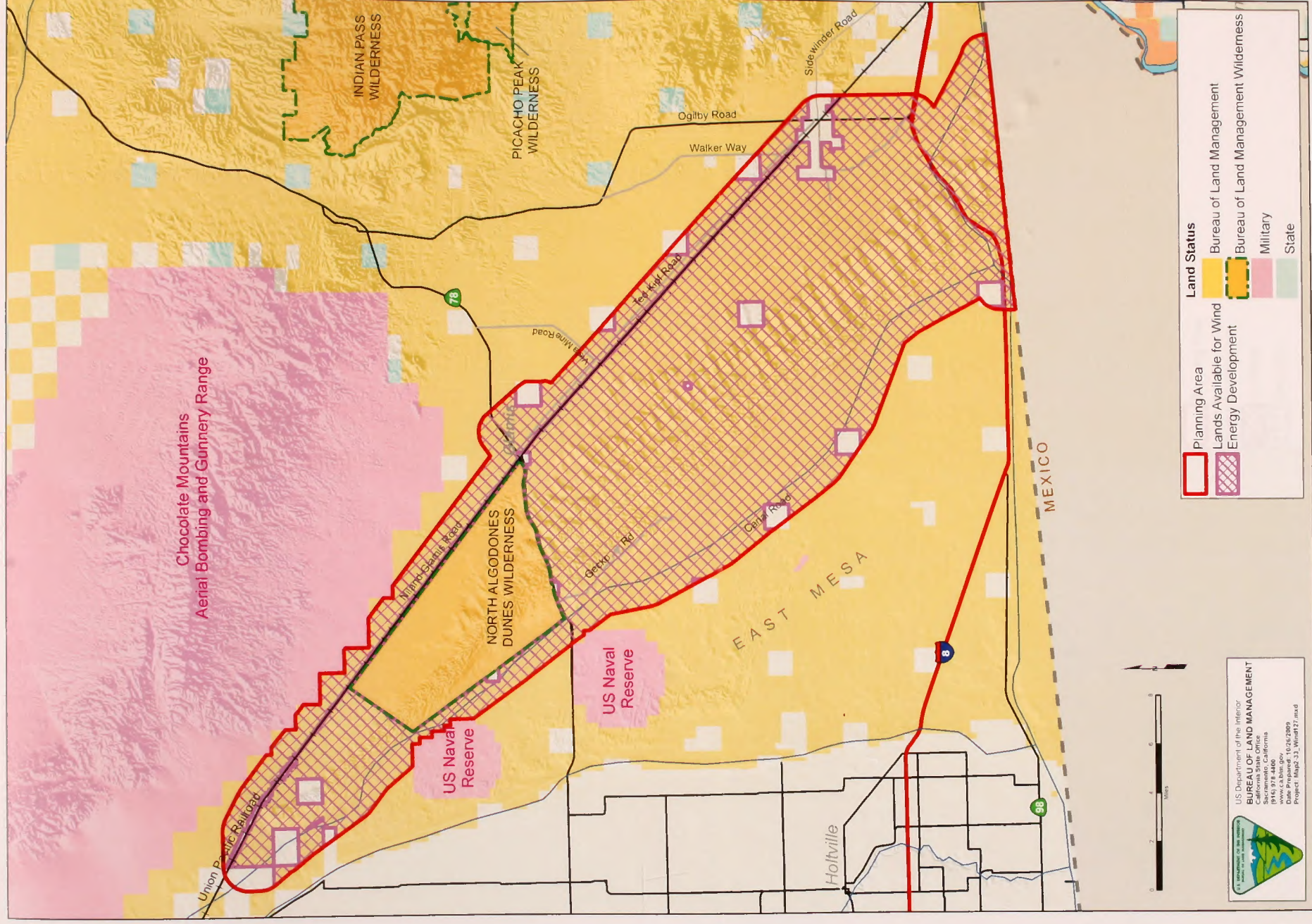
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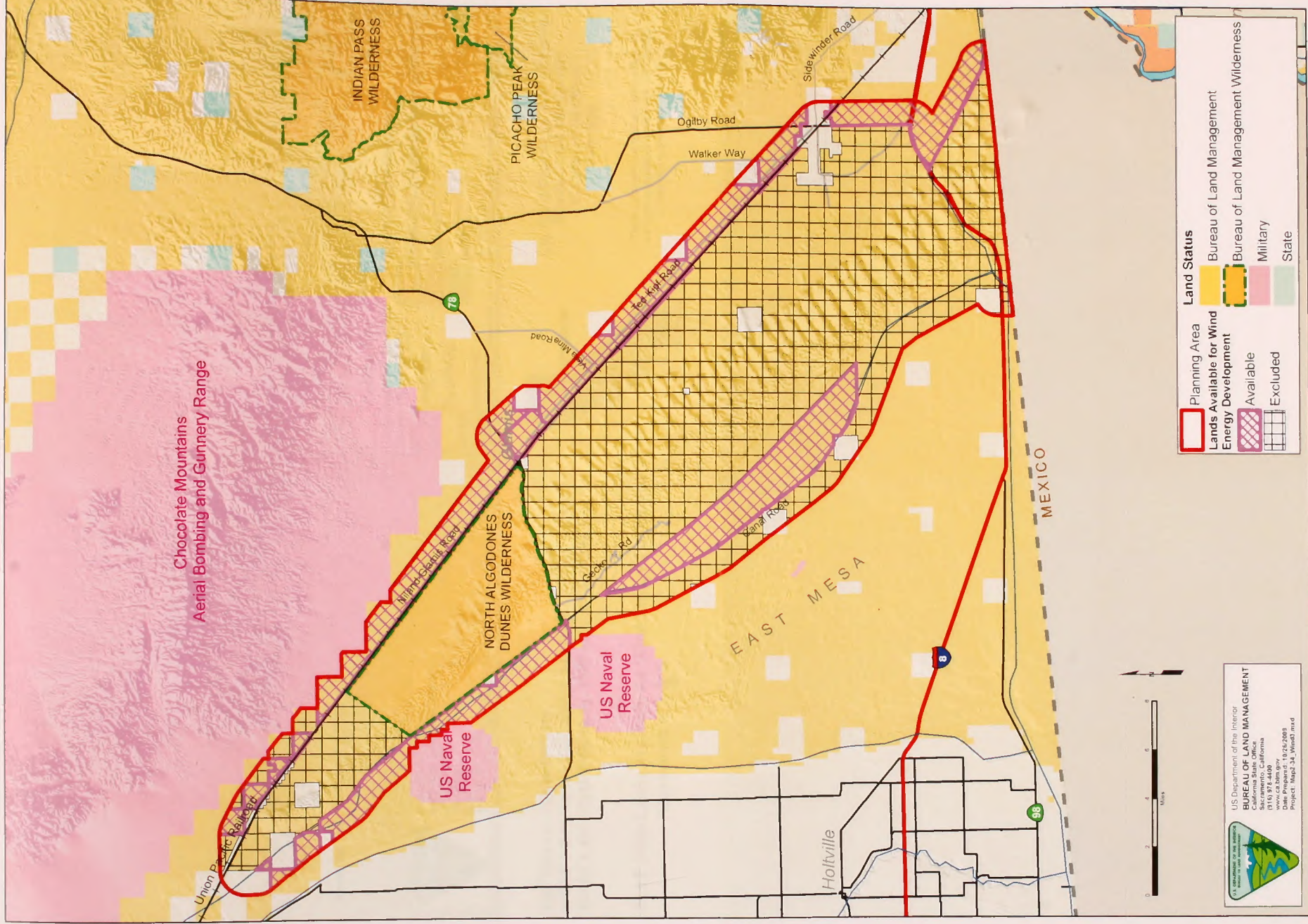
MAP 2-32: Lands Available for Solar Energy Development
Alternative 8

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MAP 2-33: Lands Available for Wind Energy Development Alternatives 1, 2 & 7



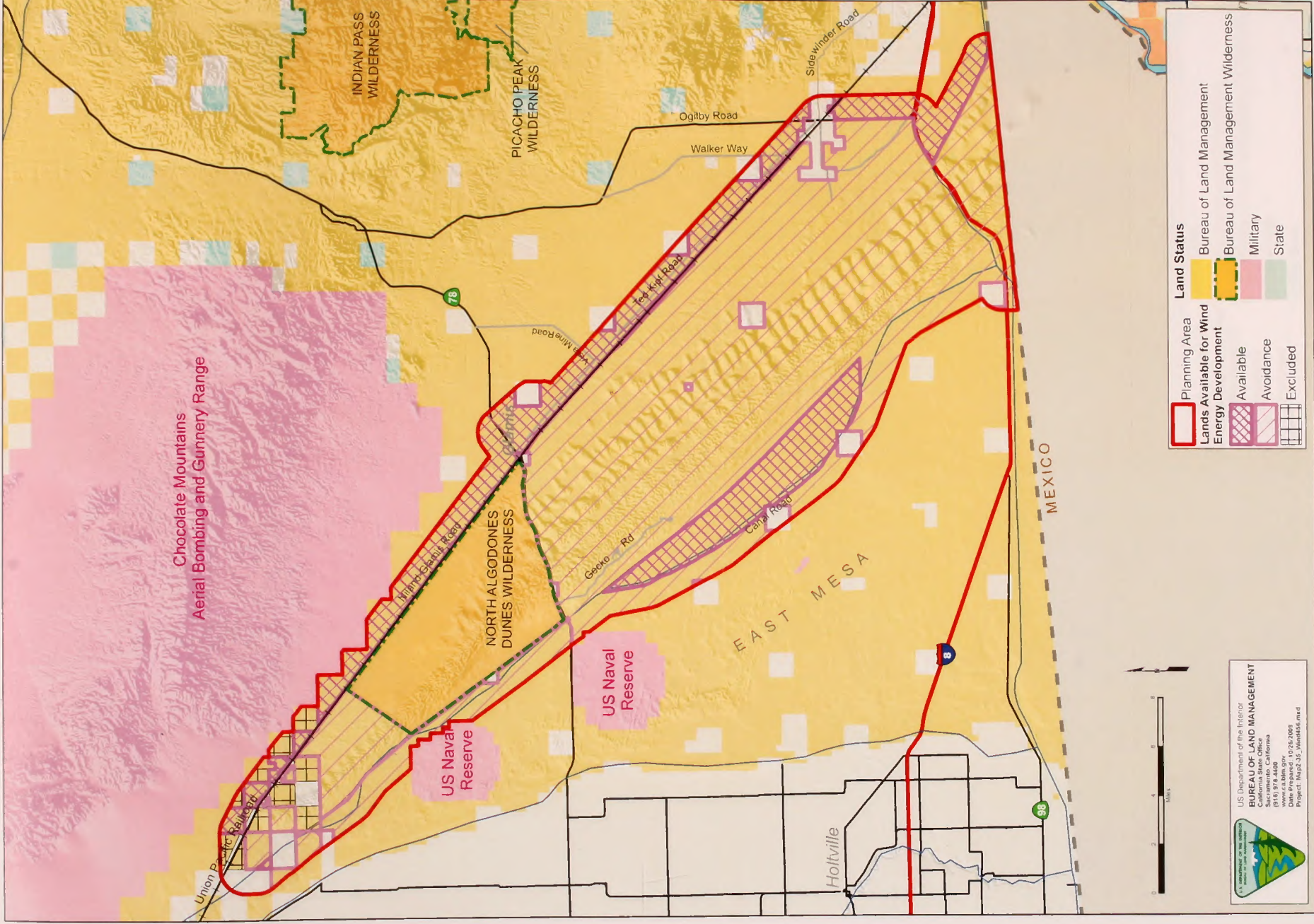
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MAP 2-34: Lands Available for Wind Energy Development
Alternative 3



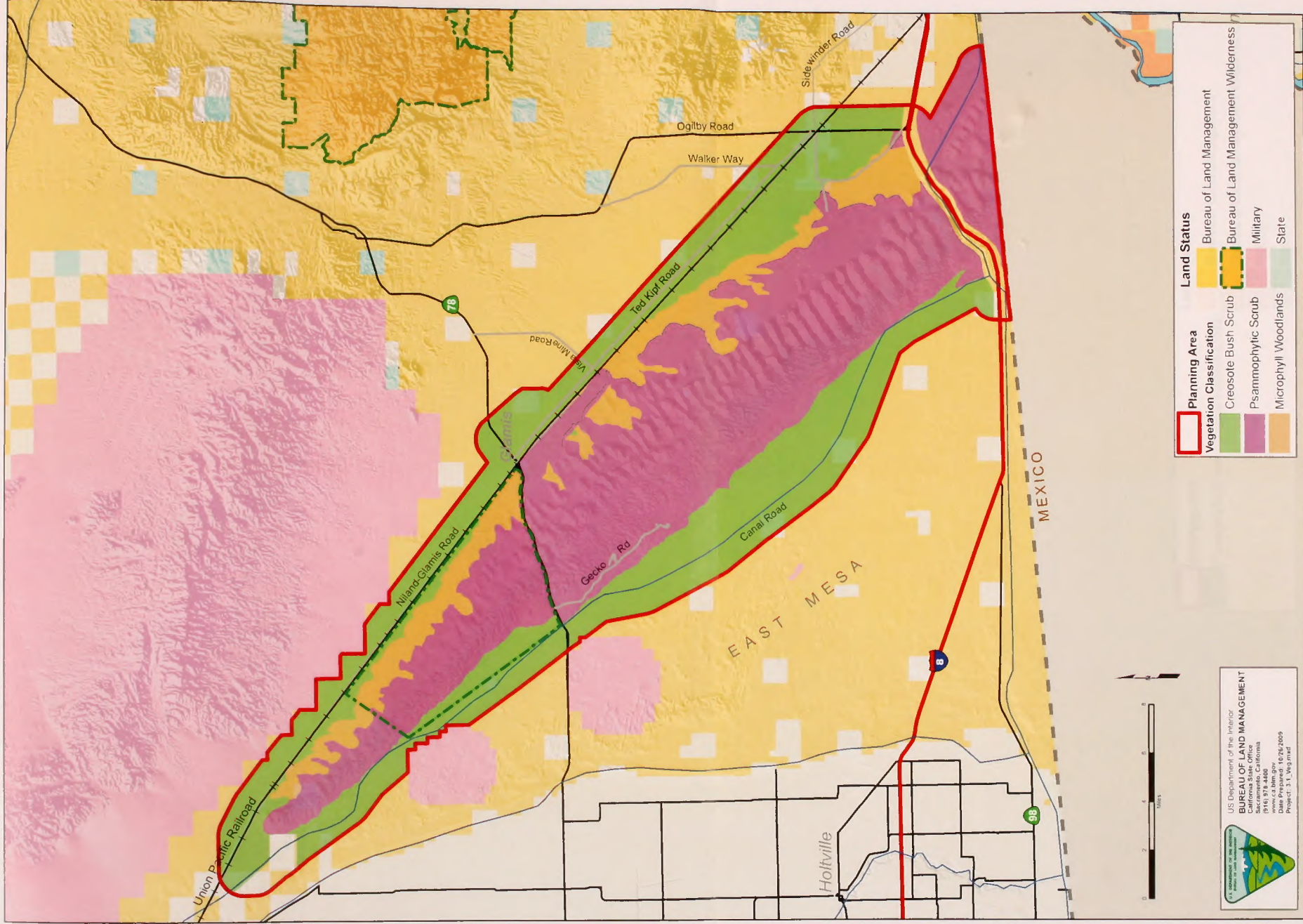
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MAP 2-35: Lands Available for Wind Energy Development
Alternatives 4, 5 & 6



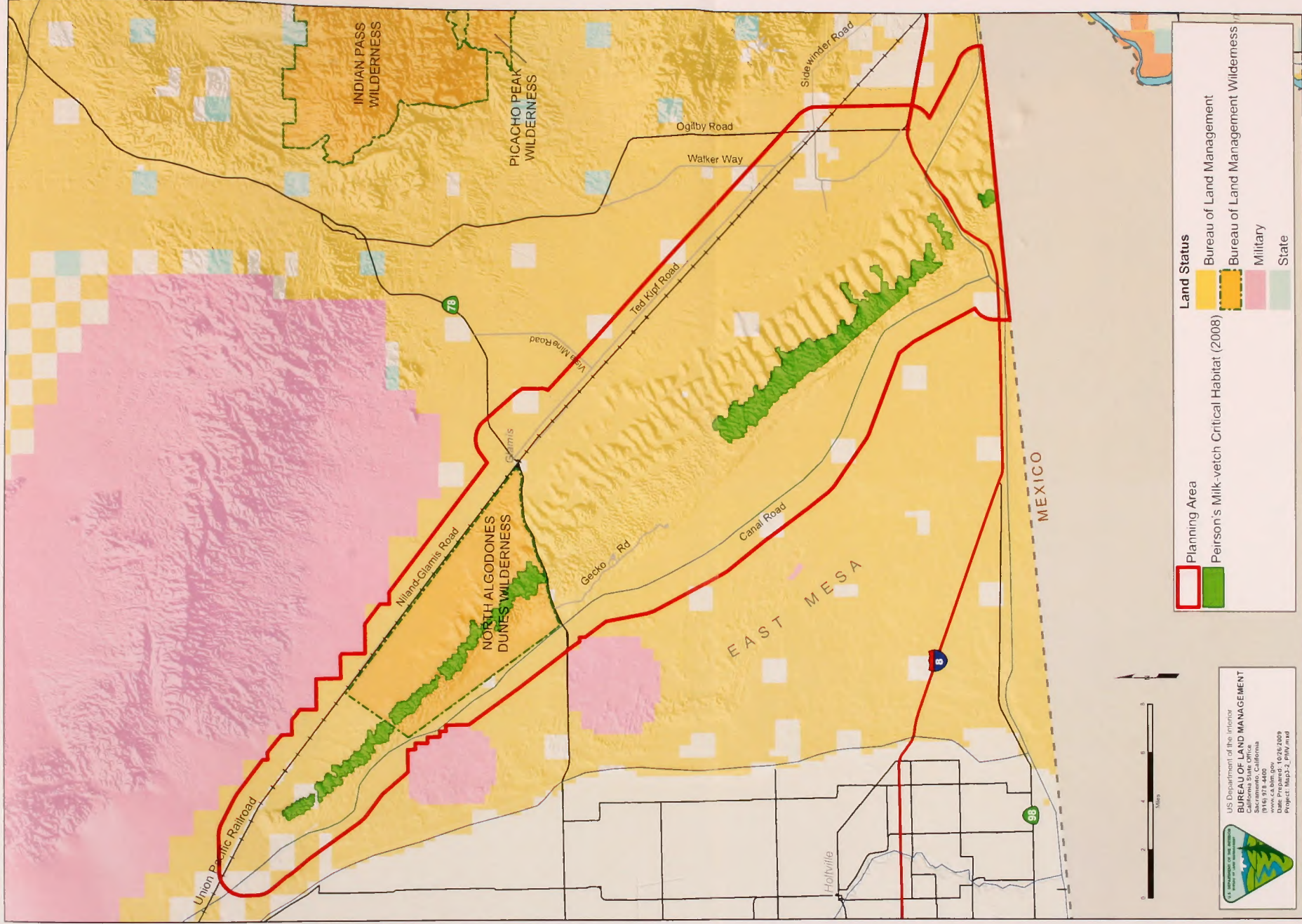
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MAP 3-1: Vegetation Communities within the Planning Area



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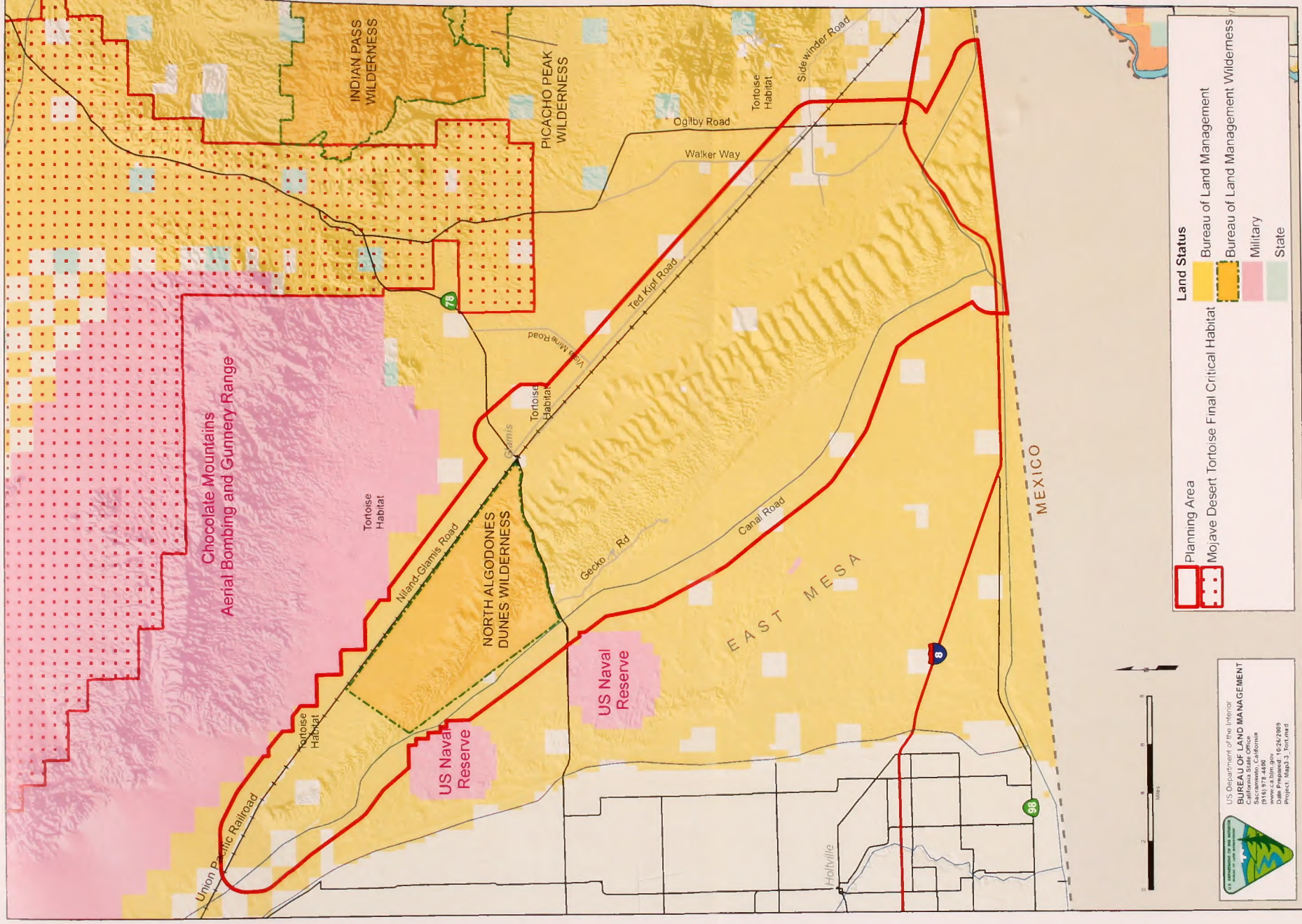


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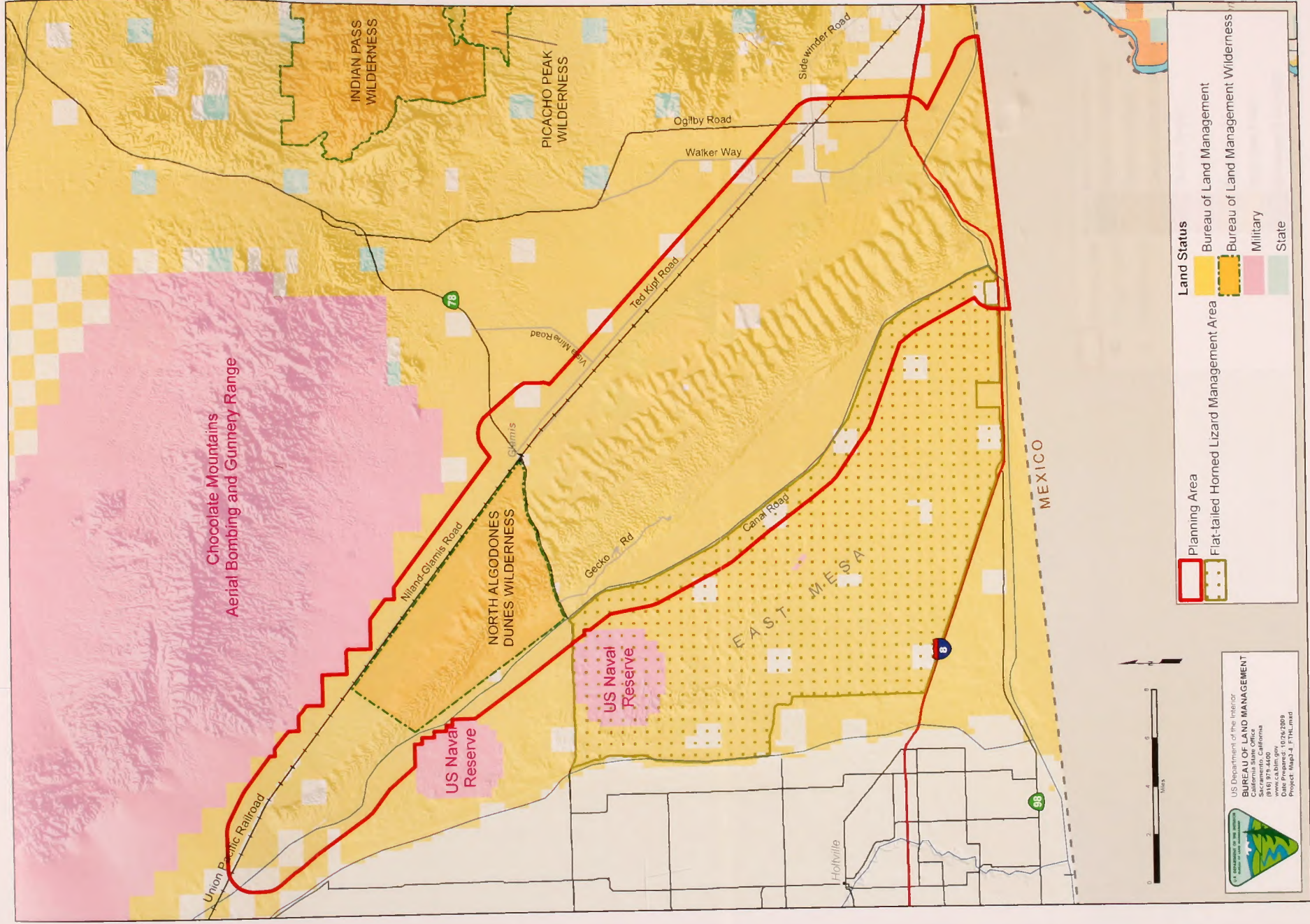
MAP 3-2: Peirson's Milk-vetch Critical Habitat

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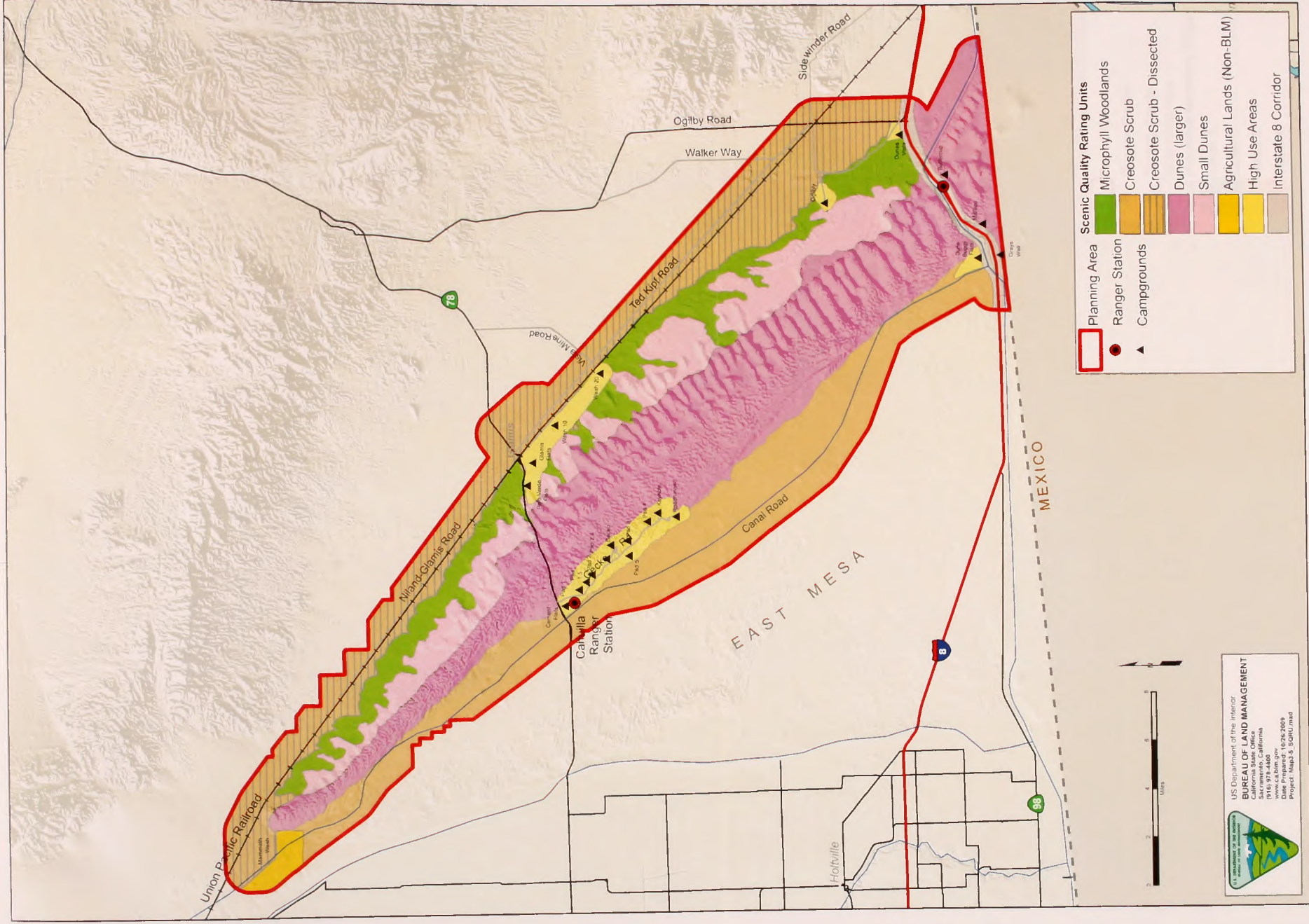
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MAP 3-4: Flat-tailed Horned Lizard Management Area

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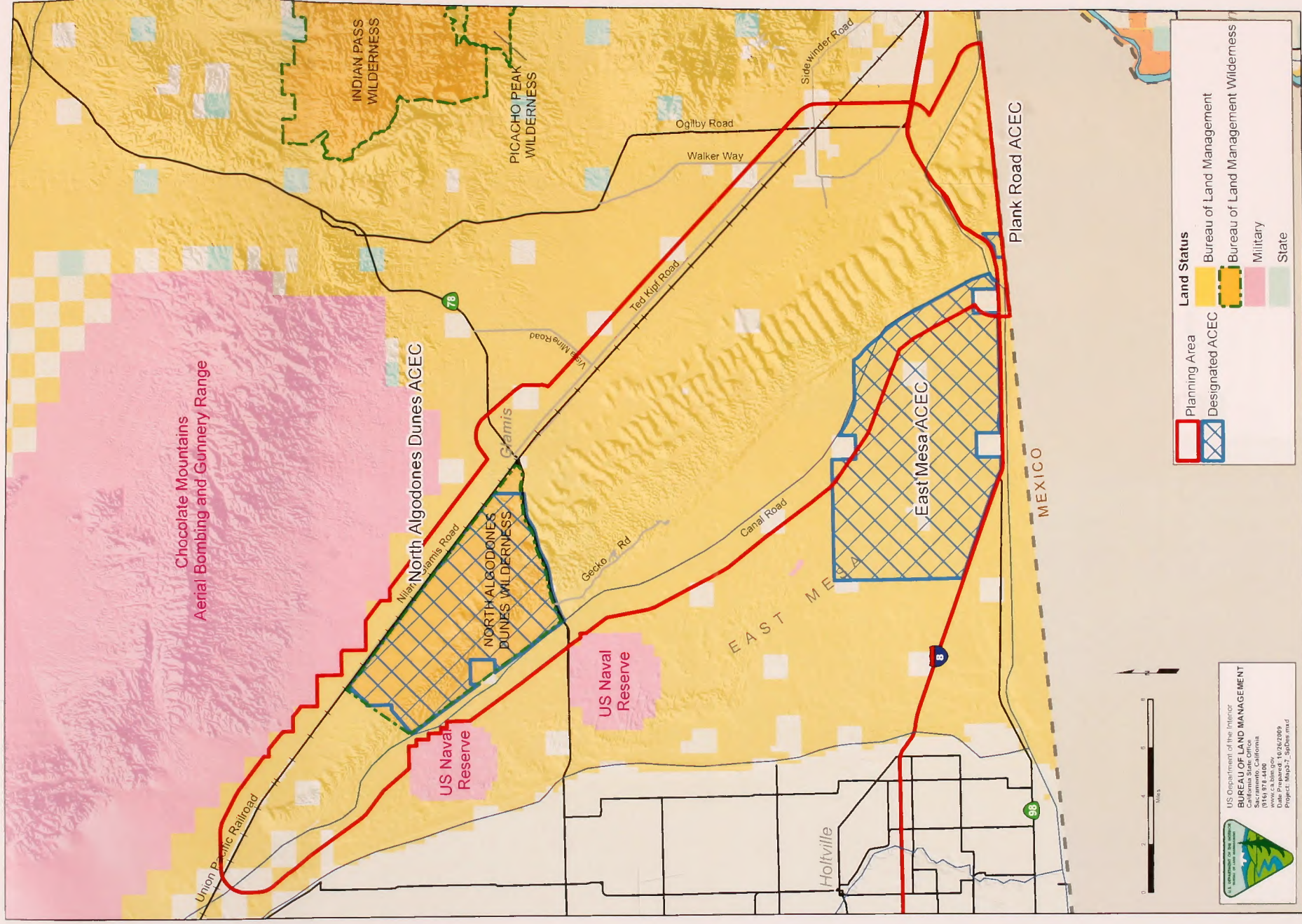
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MAP 3-5: Scenic Quality Rating Units within the Planning Area

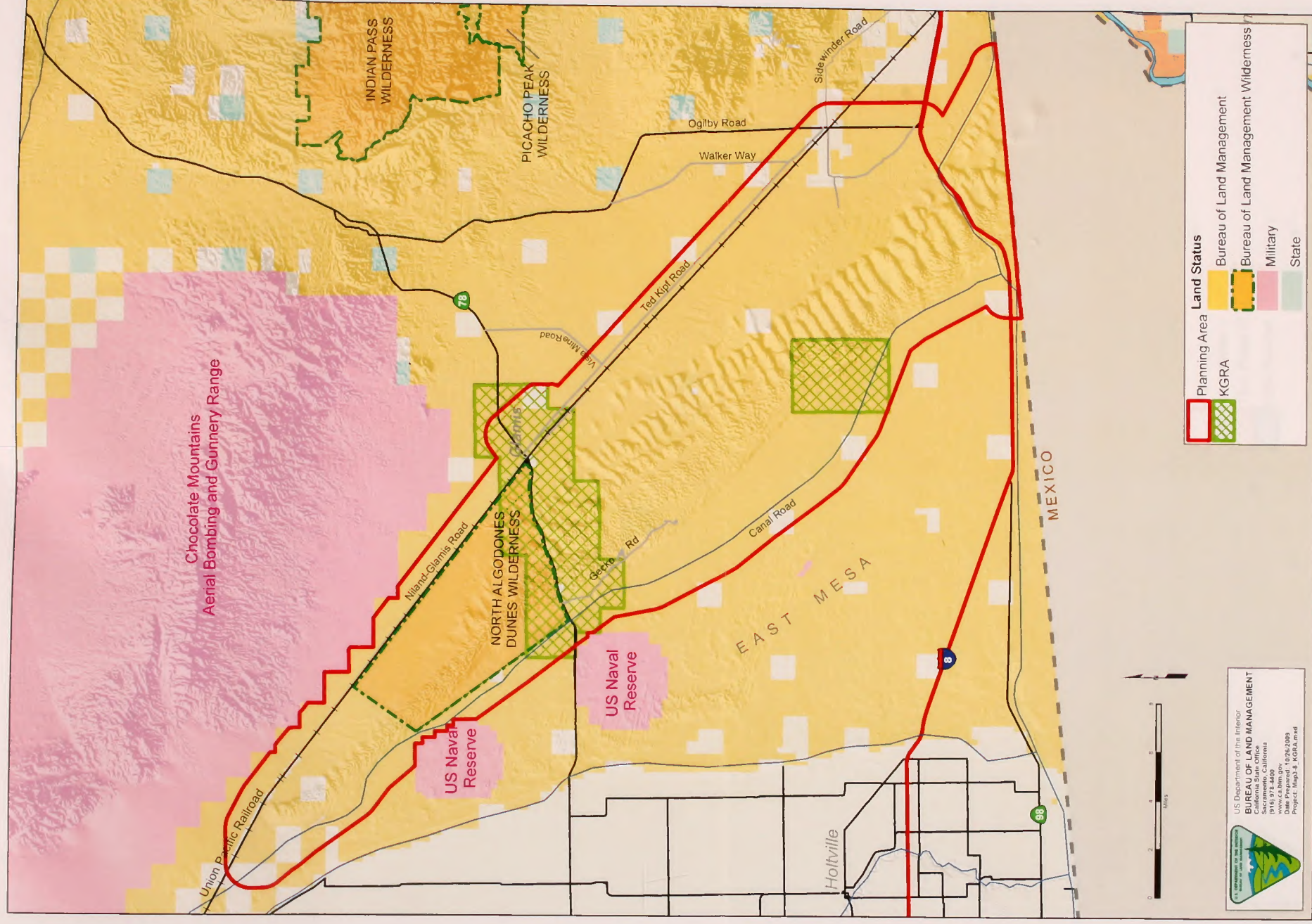


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MAP 3-7: Special Designations within the Planning Area



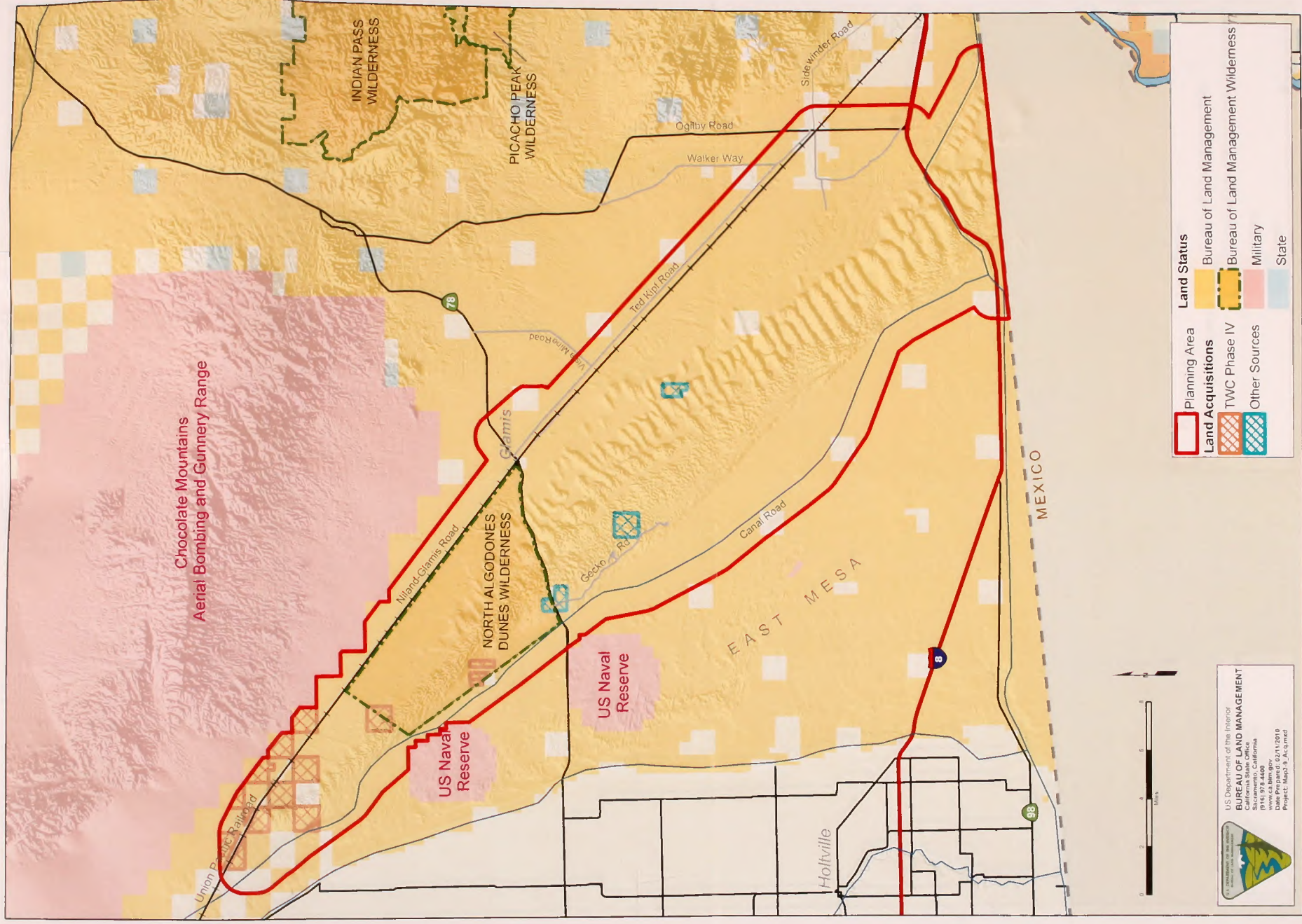
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**MAP 3-8: Known Geothermal Resource Areas (KGRAs)
 within the Planning Area**



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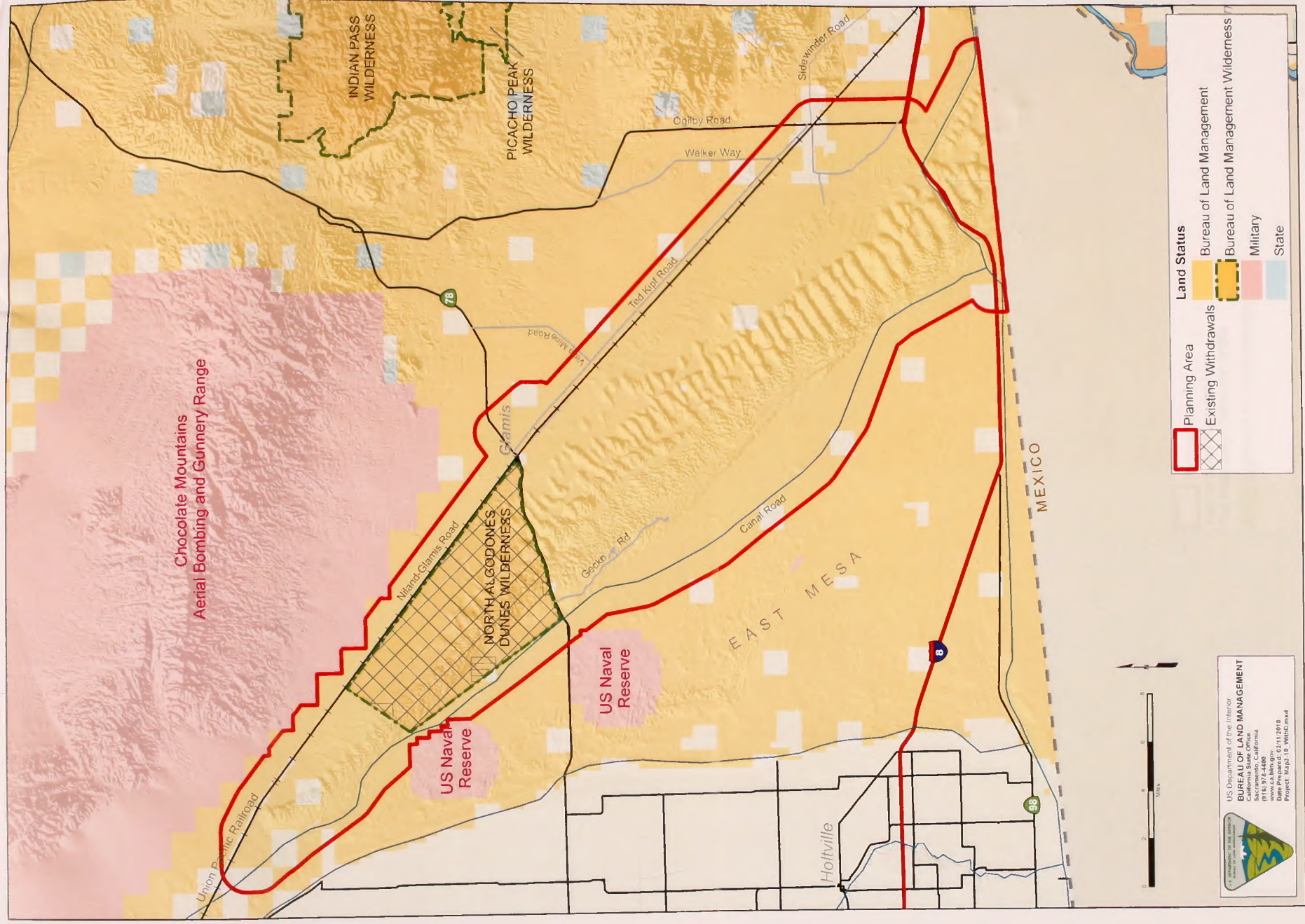
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MAP 3-9: Land and Acquisitions within the Planning Area



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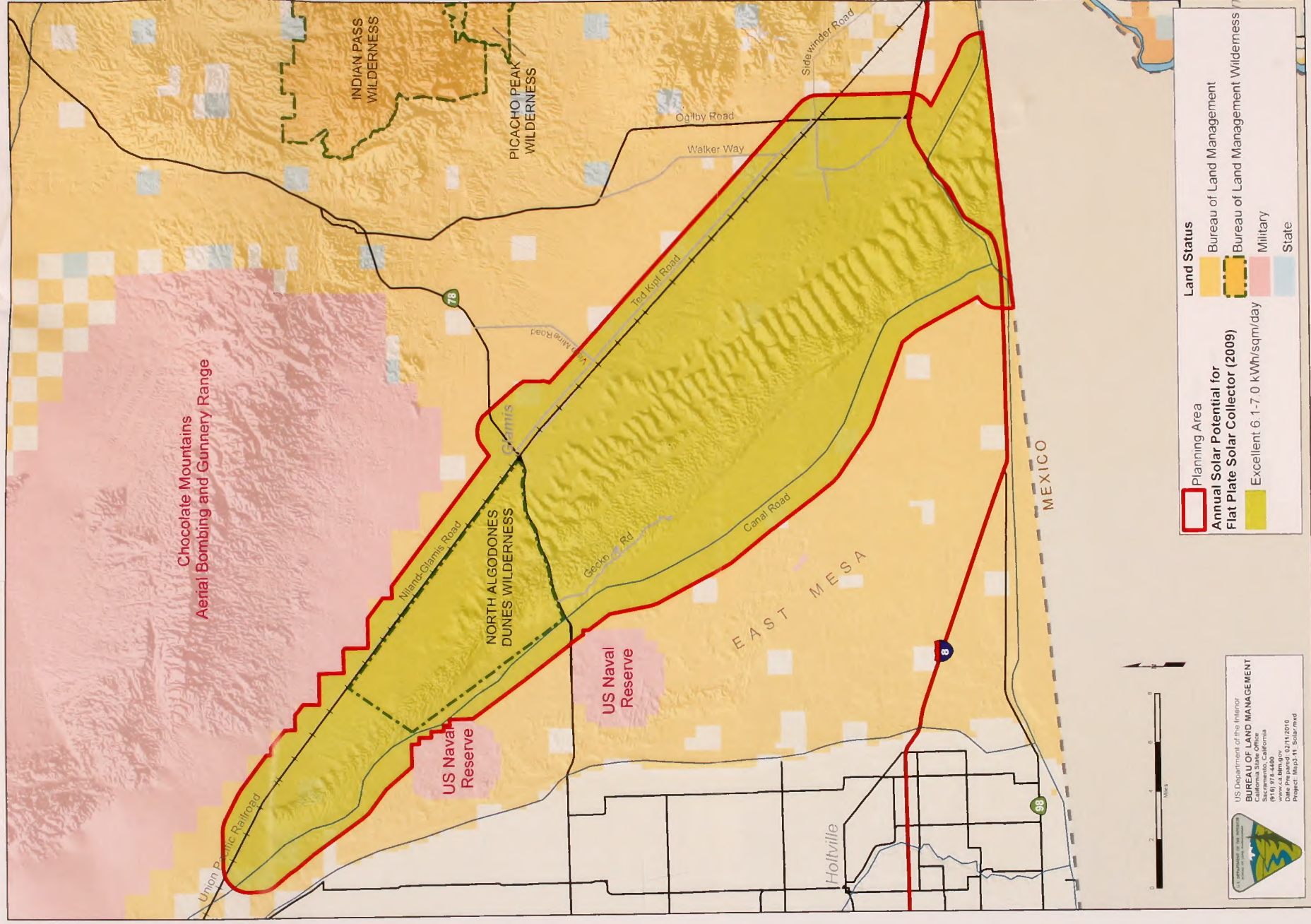
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MAP 3-10: Existing Land Withdrawals within the Planning Area

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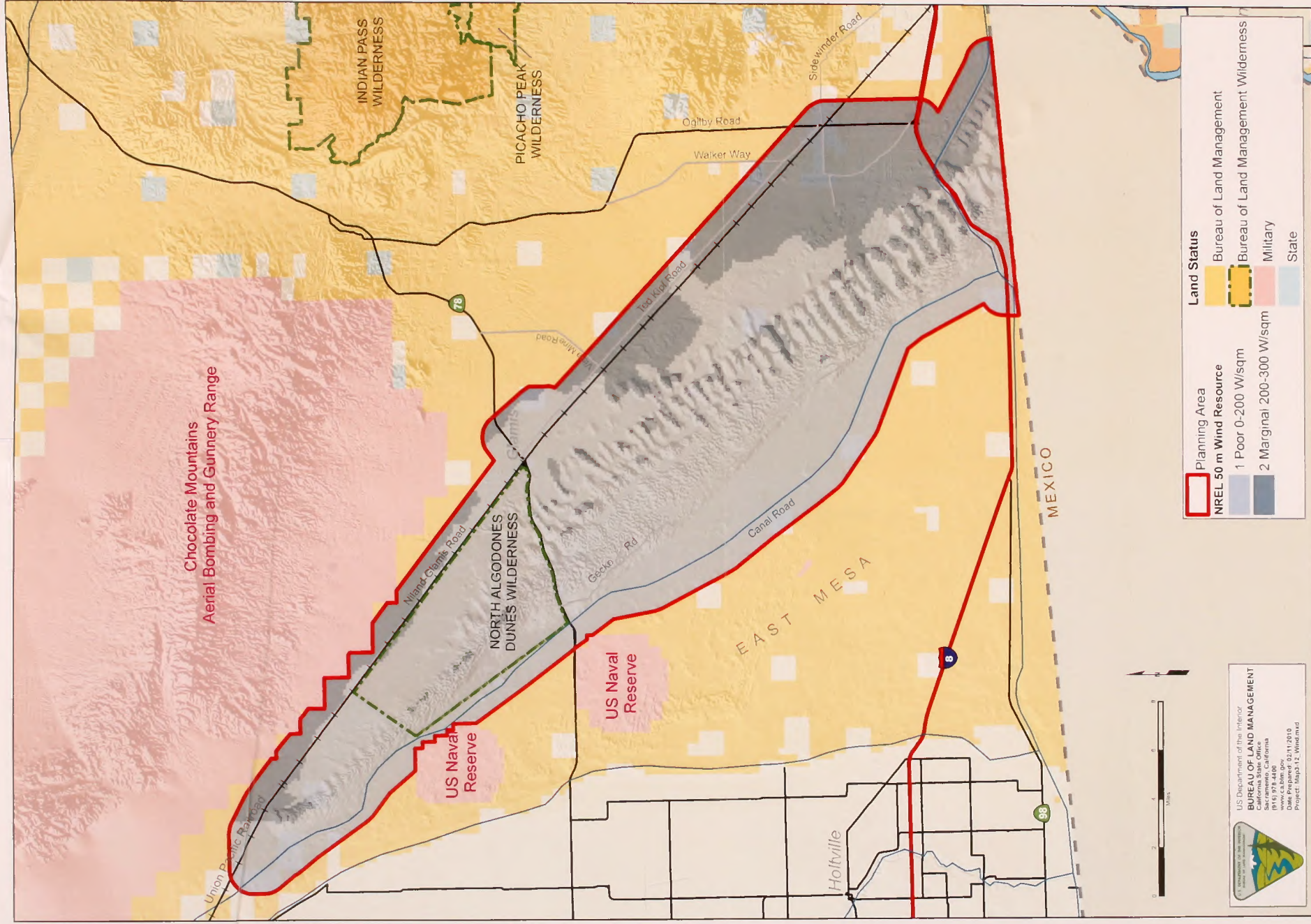
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MAP 3-11: Solar Resource Potential within the Planning Area



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MAP 3-12: Wind Energy Potential within the Planning Area



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